



CHAI-CMAI HOSPITALS



JOINT FORMULARY

1990

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Dear Friends:

We are happy to present to you the much awaited formulary. At the very outset we place on record the tremendous amount of work put in by our Joint Committee especially by Dr CM Francis its Chairman who carried the major share of the work. We also thank all others who have been instrumental and helpful in bringing out this formulary.

In this first edition we know that there can be many short-comings. We request you to send in your comments, criticisms, suggestions etc. so that our subsequent editions could be improved while updating. We intend to grade the essential drugs according to the requirements at various levels of health care in the next edition.

The reason why we undertook this work is that, while exercising "the healing ministry" of Christ our Great Healer, we do not want to lose our original vision. We should not fall a prey to over commercialisation of health services, dehumanising style of functioning, irrational drugging of the masses, etc.

This formulary is to help health personnel stick to certain rational guidelines based on the need, efficacy, quality, cost and risk-benefit ratio in selecting drugs for healing the sick. We want to minimise the side effects and adverse reactions to the extent possible.

We request all our member institutions to make use of this formulary and set an example to other hospitals. Each hospital could form a Therapeutics Committee and supervise the implementation of rational drug therapy.

With the hope and confidence that you will receive and use this with interest and join hands with us to work towards a rational drug policy for our country, we present to you this joint formulary.

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INTRODUCTION

This Hospital Formulary is for the guidance of doctors, pharmacists, nurses, and other health personnel at health care institutions affiliated to the Catholic Hospital Association of India and the Christian Medical Association of India (about 2300 institutions). It is hoped that other health care institutions will also find it useful. Our hope is that soon a new National Formulary will emerge, and that this formulary will be useful in its preparation.

2. It is a pocketbook for ready reference; it is expected that all those prescribing these drugs are conversant with the therapeutic and pharmacological effects of the drugs included in the formulary.
3. The items have been chosen on the basis of need, efficacy and cost. We have selected a few brand names. It does not mean that these are the only ones or the best available. It is hoped that with good quality control it will be possible to use *generic (medical)* names only and do away with brand names.
4. The cost shown is only approximate for guidance. There are bound to be variations and revisions.
5. The formulary will be revised periodically and updated; suggestions for improvement are welcome and should be sent to the two Associations.
6. All care has been exercised in the preparation of the formulary but there can be many mistakes. All those who prescribe are requested to check as to the correctness.

GENERAL INFORMATION

Make yourself familiar with the formulary. Read through at least once before use.

The formulary contains the generic and brand names (with the name of the manufacturer) of the drugs and formulations, in 24 sections, with subsections. Some of the sections have short informative notes. The indications, contra-indications, caution, side effects, special precautions and dosage are given; these are not exhaustive and the doctor must exercise his/her judgement while prescribing any drug to meet the needs of the particular patient. The preparations and the cost are shown; the cost may vary and revisions can occur.

An ALERT code as shown below is to draw attention to serious and significant drug interactions and precautions.

DI : Drug interactions, serious.

H : Hepatic disease.

R : Renal impairment.

P : Pregnancy.

L : Lactation.

Index: Both generic and brand names of the drugs included in the text are included in the index, giving the page numbers.

CHAI — CMAI

JOINT FORMULARY COMMITTEE

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The Committee had a large number of sittings to prepare the joint formulary. The Committee is thankful to all those who have helped in the making of the formulary. The Chairman is thankful to the members for their help and persevering efforts.

The Committee invites suggestions for the improvement of the formulary such that the formulary can be updated and effective, quality drugs with good benefit/risk ratio can be made available economically to our patients.

REFERENCE GUIDES AND TABLES

Weights and Measures

Mass	1 kilogram (kg)	=	1000 gram (g)
	1 gram (g)	=	1000 milligram (mg)
	1 milligram (mg)	=	1000 microgram
Volume	1 litre	=	1000 millilitre (ml)
	1 pint	=	560 millilitre (ml)

Approximate Domestic Equivalents

1 ounce	=	30 grams (g)
1 fluid ounce	=	30 millilitre (ml)
1 tablespoonful	=	15 millilitre (ml)
1 teaspoonful	=	5 millilitre (ml)

All liquid medicines should be measured with a graduated medicinal spoon.

Calculation of Children's Doses

Wherever available, experimentally or clinically established children's doses should be used.

Several formulae have been devised for calculating children's doses from doses known to be effective in adults. They are based on age, weight, body surface area or a combination of these. Certain fundamental physiologic properties are proportional to two-third power of body weight rather than the body weight itself, and a similar proportionality holds for the body surface area.

The two following methods of calculation may be useful in different circumstances:

Clark's Rule

$$\text{Child's dose} = \frac{\text{Weight of child (kg)}}{70} \times \text{adult dose}$$

Young's Rule

$$\text{Child's dose} = \frac{\text{Age (in years)}}{\text{Age} + 12} \times \text{adult}$$

Milliequivalents

Definition; A milliequivalent (mEq) weight is 1/1000 of the equivalent weight. An equivalent weight of an element is the atomic weight expressed in grams, divided by its valency.

This is a unit of measurement of the chemical activity of an electrolyte, and is related to the total number of ionic charges in solution, taking note of the valency

$$\text{One milliequivalent} = \frac{\text{atomic weight in milligrams}}{\text{valency}}$$

$$\text{e.g. } 1\text{mEq Na}^+ = \frac{23}{1} = 23 \text{ mg}$$

$$1\text{mEq Cl}^- = \frac{35.5}{1} = 35.5 \text{ mg}$$

Thus a solution containing 1 mEq of sodium per litre contains 23 mg sodium. A solution containing 1mEq of chloride contains 35.5 mg Cl^- and 23 mg Na^+ , i.e. 58.5 mg sodium chloride per litre.

In a salt containing ions of different valencies the weight of a salt containing 1mEq of a specified ion is calculated as follows:

$$\frac{\text{sum of the atomic weights}}{\text{valency of the specified ion} \times \text{no. of specified ions in molecule}}$$

Example: Find the weight of magnesium chloride ($\text{MgCl}_2, 6\text{H}_2\text{O}$) required to prepare a solution containing 1 mEq of magnesium per litre.

$$\frac{24.3 + (2 \times 35.5) + 6 (2 \times 1 + 16)}{2 \times 1}$$

101.7 mg $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$

For the conversion of grams per 100 ml (percentage) of a solution to milli-equivalents/litre the following formula may be used:

$$\text{mEq per litre} = \frac{\text{percentage strength} \times 10000}{\text{milligrams containing 1 mEq salt}}$$

Example: Find the number of milliequivalents of Na^+ per litre contained in a sodium chloride injection 0.9%. (1 mEq sodium is contained in 58.5 mg sodium chloride)

$$\begin{array}{rcl} \text{mEq per litre of } \text{Na}^+ \text{ in sodium} & & 0.9 \times 10000 \\ \text{chloride 0.9\% solution} & & \hline & & 58.5 \\ & = & 154 \text{ approximately} \end{array}$$

A table is attached showing the milliequivalents of a salt containing 1 mEq of a specified ion.

Milliequivalents of a salt containing 1 mEq of a specified ion

Ion	Milliequi- valent (mEq) mg	Salt	Milligrams of salt- containing 1 mEq of the specified ion
Ca^{2+}	20.0	Calcium Chloride, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$	79
		Calcium Gluconate, $\text{C}_{12}\text{H}_{22}\text{CaO}_{14}\text{H}_2\text{O}$	224
		Calcium Lactate, $\text{C}_6\text{H}_{10}\text{CaO}_6 \cdot 5\text{H}_2\text{O}$	154
K^+	39.1	Potassium Chloride, KCl	74.5
		Potassium Citrate, $\text{C}_6\text{H}_5\text{K}_3\text{O}_7 \cdot \text{H}_2\text{O}$	108
Mg^{2+}	12.5	Magnesium Sulphate, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	123
Na^+	23.0	Sodium Acetate, $\text{C}_2\text{H}_3\text{O}_2\text{Na} \cdot 3\text{H}_2\text{O}$	136

Ion	Miliequivalent (mEq) mg	Salt	Milligrams of salt-containing 1 mEq of the specified ion
		Sodium Acid Citrate, $C_6H_6Na_2O_7, 1\frac{1}{2}H_2O$	131
		Sodium Acid Phosphate, $NaH_2PO_4, 2H_2O$	156
		Sodium Bicarbonate, $NaHCO_3$	84
		Sodium Chloride, $NaCl$	58.5
		Sodium Citrate, $C_6H_5Na_3O_7, 2H_2O$	98
		Sodium Lactate*	
Cl^-	35.5	Calcium Chloride, $CaCl_2, 2H_2O$	73.5
		Potassium Chloride, KCl	74.5
		Sodium Chloride, $NaCl$	58.5
$C_2H_3O_2^-$ (Acetate)	59.0	Sodium Acetate, $C_2H_3O_2Na, 3H_2O$	136
$C_3H_5O_3^-$ (Lactate)	89.0	Calcium Lactate, $C_6H_{10}CaO_6, 5H_2O$	154
		Sodium Lactate*	
HCO_3^-	61.0	Sodium Bicarbonate, $NaHCO_3$	84

* Prepared in solution by neutralising lactic acid with sodium hydroxide: 1.0 ml of 1 mg sodium lactate contains the equivalent of 112 mg.

Centigrade — Fahrenheit Temperature Conversion and Equivalents: To convert Fahrenheit to Centigrade, subtract 32° from $^\circ F$, multiply by 5 and divide by 9

$$\frac{(^{\circ}F - 32)5}{9}$$

To convert Centigrade to Fahrenheit, multiply °C by 9, divide by 5 and add 32.

$$\frac{^{\circ}\text{C} \times 9}{5} + 32$$

Clinical ranges

Centigrade	Fahrenheit
35	95
35.5	95.9
36	96.8
36.5	97.7
37	98.6
37.5	99.5
38	100.4
38.5	101.3
39	102.2
39.5	103.1
40	104.0
40.5	104.9
41	105.8
41.5	106.7
42	107.6

Abbreviations in Common Use

Latin	Abbreviation	English
Ad	Ad	to, up to
Ana	a.a.	of each
Ante	a.	before

Latin	Abbreviation	English
Ante cibos	a.c.	before food
Bis in die	b.i.d.	twice a day
Bis die sumendum	b.d.s.	twice a day
Capsula	cap.	capsule
Gutta	gut.	drop
Hora somni	h.s.	at bedtime
Nocte	noct.	night
Octarium	o.	pint
Omini die	o.d.	every day
Per os	p.o.	by mouth
Post cibos	p.c.	after food
Pre re nata	p.r.n.	as needed
Quantum sufficit	q.s.	a sufficient quality
Quarter in die	q.i.d.	four times a day
Quinque quarteur hora	q.q.h. (q.4.h.0)	every four hours
Si opus sit	s.o.s.	if needed
Statum	stat.	at once
Syrup	syr.	syrup
Tabella	tab.	tablet
Ter in die	t.i.d.	three times a day
Ter die sumendum	t.d.s.	three times a day
Tincture	tinct.	tincture
Unguentum	ung.	ointment

Abbreviations used in this formulary

C.I.	: Contra-indications
D.I.	: Drug interactions
I.M.	: Intramuscular
I.V.	: Intravenous
Max.	: Maximum
Prep.	: Preparation

S.C.	: Subcutaneous
S.E.	: Side effects
S.P.	: Special precautions
tsp	: Teaspoonful
CMS-I	: Comprehensive Medical Service-India

Guidelines for prescribing

1. The Hospital Formulary has been drawn up with the guidance of the World Health Organisation List of Essential medicines, the British National Formulary and other authoritative lists, and contains a wide range of items. Prescribe from this formulary. If other items are required, please get the approval of your hospital.
2. Prescribe a drug only if there is a good indication and the benefit-risk ratio is good.
3. The drug must be efficient and cost effective. When considering the cost, think of it for the entire treatment and not merely a single dose.
4. Prescribe as few medicines as possible. Patient compliance is greatly reduced as the number of medicines is increased. Financial constraints may result in incomplete courses being taken, or the patient selecting himself only some of the items which have been ordered. It would also reduce the possibility of drug interactions.
5. Prescriptions must be written legibly and in ink.
6. Prescriptions must show the following details:
 - a. Name of patient
 - b. Age of patient
 - c. Hospital registrat mber
 - d. Date
 - e. Name of the medicine — preferably the generic name, if not, the brand name in this Formulary.
 - f. Do not use abbreviations for the names of drugs. You may cause the pharmacist to dispense inaccurately.

- g. The form of the medicine -- injection, tablet, etc.
- h. The amount of medicine to be dispensed written in the metric system only, as follows:
 - Above one gram 1g
 - Less than 1 gram in milligrams (mg) (500mg rather than 0.5g)
 - Less than 1mg write preferably in micrograms in full (not 0.1mg for example)

The amount to be dispensed should be the total number of doses for tablets and injections, and the total volume in the case of liquids. Alternatively the number of days of treatment can be written. Remember the pharmacist cannot calculate the quantity to be dispensed for instructions such as 'when necessary' or when lotions and ointments are prescribed.

- i. The directions to the patient which the pharmacist has to write on the label, and explain to the patient.
 - j. The doctor's signature in full; initials are not acceptable.
-
- 7. Give clear instructions to the patient, and in the case of children and those who cannot understand, to the relatives.
 - 8. If an overdose or an unusually high or low dose is prescribed endorse the prescription 'quantity verified'.
 - 9. To avoid wastage of medicines for inpatients (and unnecessary refunds) prescribe not more than one week's requirement. For the initial antibiotic order, prescribe a maximum of three days medicine.
 - 10. To avoid drug interactions always ask the patient if he or she is taking any other drug, including household remedies.
 - 11. Ask the patient whether there have been previous reactions to a particular drug and to drugs in general.
 - 12. Inform the patient that any drug may produce adverse reactions and that such reactions must be reported promptly.

13. For prescribing in pregnancy, for children, the elderly and those suffering from hepatic disease or renal impairment, see 'Prescribing under special circumstances'.
14. Dangerous Drugs (e.g. pethidine, morphine, cocaine) when prescribed and dispensed are subject to special records and have to be reported to the State Government. The dose, and the quantity to be supplied should be stated in words and figures.

No clinician may prescribe dangerous drugs for himself or for his family. Any such requirement must be written by the senior doctor supervising the treatment.
15. Treatment with drugs is only one part of the management of patients. Use other methods of management also to restore the patient to health.

Guidelines for Dispensing Medicines

1. Read the prescription twice. Ensure that all the required details are given, such as patient's name, age, hospital number, date, medicine, strength of medicine, quantity, directions, and full signature of the doctor.
2. If in doubt about any details, consult your pharmacist colleague. Listen to his interpretation *before* you give yours. If still in doubt consult the prescriber or another doctor who has access to the patient's records.
3. Dispense each item on the prescription carefully. Check the label on the container as you take it from the shelf, again as you remove the contents, and again as you replace in on the shelf. If possible get another pharmacist to check what you have dispensed. Patient safety is the first consideration at all times.
4. You may substitute one brand for another of a prescribed medicine. You must not substitute another drug for the one prescribed.

5. Write the labels clearly in ink and include the following:
 - a. Generic name of the medicine (If a compound with no generic name, the brand name may be used)
 - b. The form of the medicine, tablet, injection, etc.
 - c. The strength of the medicine
 - d. The directions for use
 - e. Warning labels where necessary, e.g. 'for external use only'.
 - f. The patient's name
 - g. The name and address of the Hospital (This will normally be printed on the label).

The label should be in a language the patient can read. For illiterate patients, symbols may be used in addition to the written instructions. Preferably ask another pharmacist to check the labels.

6. Make the records required by law and/or by the rules of the Hospital.
7. Give the medicines to the patient, and ensure that he understands how the medicines are to be used.
8. Retain the prescription for the pharmacy records.
9. Dispense only prescriptions written by the hospital doctors for patients registered by the hospital records office.
10. Where there is any doubt about the authority of a prescription, especially for scheduled medicines or narcotics, it is the pharmacist's legal responsibility to check with the prescriber *before* making the supply.
11. Increase your knowledge of the medicines you dispense by reading the package inserts, and especially the reference books in the pharmacy. This will enable you to give better service to the patients, doctors and nurses.
12. Maintain a high standard of professional conduct at all times in relation to dress, tidiness of the pharmacy benches, fittings and floor space. Remember you represent the profession at all times, and from you the patients will have a lasting impression of the institution.

HOW TO DISPENSE A DRUG (SEQUENCE OF ACTION)

Drugs and Accessories are to be purchased, stored and dispensed by an ethically fit, legally qualified, and professionally competent Pharmacist with managerial awareness and good practices. The Pharmacist has to provide effective drug information and patient counselling.

While dispensing drugs and accessories, a Pharmacist should observe the following sequence of actions to obtain success in the profession.

Step 1 — (Pre-requisite) — The Pharmacist utilises the ethical, legal, technical (pharmaceutical) & managerial principles and good practices.

Step 2 — The Pharmacist receives the prescription in a very polite and professional manner preferably with a pleasing smile and lends a patient listening to the bearer of the prescription without any comments.

Step 3 — The Pharmacist reads the prescription carefully and develops a clear concept.

Step 4 — The Pharmacist thinks properly regarding the ethical, legal, technical and managerial feasibility of the prescription.

Step 5 — The Pharmacist makes sure about the availability of the right medicines and accessories to be dispensed.

Step 6 — The Pharmacist plans scientifically as to what is the sequence of dispensing to make the activity methodical and perfect.

Step 7 — The Pharmacist organises efficiently by providing the right containers, closures, packets, labels, writing aids, and other materials for dispensing the prescription.

Step 8 — The Pharmacist executes the act of dispensing promptly in a very scientific, professional and methodical manner as per the planning

Step 9 — The Pharmacist performs a critical judgement before handing over the medicines to the patients, as to whether he has listened to the

bearer properly, whether he has read the prescription correctly, whether he has dispensed the right medicines without any approximations in identity, countings, weighings, measurements, whether he has affixed the right label with all directions, whether he has evaluated the therapeutic efficacy correctly, whether he has complied with the legal formalities, and whether he could identify the bearer of the prescription.

Step 10 — The Pharmacist makes suitable and timely correction immediately.

Step 11 — The Pharmacist gives the medicines to the right patient in the right time and at the right charges.

Step 12 — The Pharmacist ultimately performs effective communication adopting the ABCT principles of communication (Accuracy, Brevity, Clarity and Timing) and if, needed, provides the right drug information and patient counselling.

All the above process should be performed by the pharmacist in quick succession.

SCHEDULES OF DRUGS

A number of schedules are given in the Drugs & Cosmetics Act and Rules 1940 and 1945, which are of theoretical and practical importance to the Dispensing pharmacist.

Sch: G — List of substance that are required to be used only under medical supervision and which are required to be labelled accordingly. (Insulin, antihistiminic drugs, etc).

Sch: H — List of substances that could be dispensed only on the prescription of Registered Medical Practitioner. (Sulpha drugs, antibiotics, etc.)

Narcotic Sch: H — List of narcotic drugs (Pethidine, morphine, etc.).

Sch: X — List of psychotropic substances (Phenobarbitone, its salts, pentazocine, diazepam, chlordiazepoxide etc.)

Sch: N — List of minimum equipment and other facilities a pharmacy should possess.

Sch: P — Life period of drugs. (Usually these are specified on the label. When it is not specified, it should be used only for a period of 5 years from the date of manufacture)

Sch: V — Standards for patent and proprietary medicines containing vitamins. (prophylactic, paediatric, therapeutic). While identifying such medicines containing vitamins, we should identify their use such as paediatric, prophylactic and therapeutic (Identified on the labels).

Sch: W — List of drugs which can be marketed under generic names only.

At present narcotic drugs and psychotropic substances are controlled by the following acts:

- i. The Drugs and Cosmetics Act 1940 & 1945.
- ii. The Narcotic drugs and Psychotropic substances Act 1985 (not by Dangerous drugs Act 1930 which is already repealed and replaced in 1985).

PRESCRIPTION FOR PSYCHOTROPIC SUBSTANCES AND OTHER SCHEDULE DRUGS

Following conditions are made statutory as per the Drugs and Cosmetics Act & Rules 1940 & 1945.

SALE OF SCHEDULE DRUGS (Sch H, Narcotic Sch H, Sch X)

Sch H, Narcotic Sch H and Sch X drugs should not be dispensed except on the prescription of a Registered Medical Practitioner. Prescriptions ordering such drugs should not be dispensed more than once unless otherwise specified.

If the prescription contains a direction that it may be dispensed more than once and at specified intervals, it may be repeated according to such direction only.

At the time of dispensing a prescription, the dispenser should note his name, address and the date of dispensing above the signature of the prescriber.

In dispensing schedule H, Narcotic Sch H and Sch X prescriptions, no substitution should be made therein.

In case of schedule X drugs, the prescriptions should be in duplicate, one copy of which should be retained at least for 2 years.

Separate bound and paged registers should be maintained for supply in which separate sheets should be allotted for each drug.

The following particulars should be entered at the time of supply:

- a) Date of supply and opening and closing stocks of drugs on that day and relevant bill numbers.
- b) Name of the drug, name of the manufacture and Batch No.
- c) Name and address of purchaser.

d) Date of prescription and name and address of the registered medical practitioner.

e) Signature of person under whose supervision supply is made.

The cash or credit bills should bear signature of purchaser with his address. Transactions of schedule X drugs should be recorded in separate registers in which in addition to the above details, the quantities purchased should be recorded together with name and address of the supplier and his licence number.

Storage of Schedule X Drugs, Narcotic Sch H Drugs and Drugs with Expiry Dates.

Drugs specified in schedule X and Narcotic Sch H should be stored under lock and key in separate drawer or cupboard reserved for their storage, in a part of the establishment which is separate from the remainder of the premises and to which the customers have no access. Other drugs with an expiry date should be stored in a separate cupboard.

BANNED DRUGS

Government of India has banned the following irrational and fixed dose combinations.

1. Amidopyrine
2. Fixed dose combinations of vitamins with anti-inflammatory agents and tranquillisers.
3. Fixed dose combinations of atropine in analgesics and antipyretics.
4. Fixed dose combinations of strychnine and caffeine in tonics.
5. Fixed dose combinations of Yohimbine and strychnine with Testosterone and vitamins.
6. Fixed dose combinations of iron with strychnine, arsenic and Yohimbine.
7. Fixed dose combinations of sodium bromide/chloral hydrate with other drugs.
8. Fixed dose combinations of Ayurvedic, Unanic drugs with modern drugs.
9. Phenacetin
10. Fixed dose combinations of Antihistaminics with Anti-diarrhoeals.
11. Fixed dose combinations of Pencillin with sulphonamides.
12. Fixed dose combinations of vitamins and analgesics.
13. Fixed dose combinations Tetracycline with Vitamin C.
14. Fixed dose combinations of Hydroxyquinoline groups of drugs except preparations which are used for the treatment of diarrhoea and dysentery and for external use only.
15. Fixed dose combinations of steroids for internal use except combination of chloramphenicol and streptomycin.

16. Fixed dose combinations of chloramphenicol for internal use except combination of chloramphenicol and streptomycin.
17. Fixed dose combinations of ergot.
18. Fixed dose combinations of vitamins with anti T.B drugs except combination of INH with vitamin B6.
19. Penicillin skin/eye ointment.
20. Tetracycline liquid oral preparations.
21. Nilamide
22. Practolol
23. Methpyrilene, its salts.
24. Methaqualone, its salts.
25. High dose oestrogen and progesterone combinations.

Government is in the process of banning the following categories of fixed dose combinations.

1. Fixed dose combinations of tranquillisers with analgesics and antipyretics.
2. Fixed dose combinations of essential oils with alcohol with higher than 20 percent proof.
3. Fixed dose combinations of antiulcer drugs (Cimetidine, Ranitidine, etc) with other drugs.
4. Fixed dose combinations of chloroform with other drugs.
5. Fixed dose combinations of pectin and kaolin should not be allowed to be combined with antiamoebic or antibacillary drugs.
6. Fixed dose combinations of analgin.
7. Fixed dose combinations of penicillin with streptomycin.

8. Fixed dose combinations of Ethambutol with INH.
9. Fixed dose combinations of antihistamines.
10. Fixed dose combinations of Enzymes.
11. Fixed dose combinations of Ibuprofen with narcotic and non-narcotic analgesics.
12. Fixed dose combinations of metaclopramide with paracetamol.

Guidelines on Storage of Medicines

1. Store medicines in a cool, dry place.
2. Storage places must be free from infestation with rats, cockroaches, ants, etc.
3. Vaccines and other biological products must be stored between 2° and 8° C in a refrigerator. They must not be frozen. A common exception to this rule is polio vaccine which is usually stored frozen. Check labels for the correct storage temperature. The shelves near the refrigerator freezing compartment will be at a lower temperature than the shelves at the bottom of the refrigerator. Check the temperature using a thermometer.
4. Stability of vaccines and biologicals under the 2° to 8° C range is variable. Whenever they have to be carried outside the institution they should be carried in a flask containing ice.
5. Note that many antibiotics should be stored below 25° C.
6. Always ensure that all types of pharmacy stock are used in rotation, 'First in, first out' rule should be followed.
7. Observe the expiry dates on medicines. Strict rotation of stock will help this. It is an offence under the Drugs and Cosmetics Act to keep in the pharmacy or pharmacy store any outdated items.

8. In the pharmacy keep all medicines in their original containers as far as possible. Some medicines may need special storage conditions, e.g., protection from light. These conditions must be observed when transferring to containers for departmental or patient use.
9. Advise patients on the safe storage of their medicines at home, and particularly to keep them out of the reach of children.
10. Rules for the management of the pharmacy store and pharmacy are given in other publications.

Constitution and use of some commonly used intravenous Infusions:

Aminophylline

- Loading dose — 5mg/kg i.v. slowly, over 20 min. preferably while patient is receiving oxygen. Loading dose should be omitted or halved in patients who are already on maintenance aminophyllin.
- Maintenance i.v. infusion — 500 mg to be added to one unit of 5% dextrose or N-saline. This gives a concentration of approx. 1 mg/ml. Infusion rate 0.5 — 0.75 mgm/kg/hr for non-smoking adults; 1 mg/kg/hr for adolescents, children and smokers; and 0.4 — 0.5 mg/hr for the elderly and those with CCF or liver disease. For practical purpose no. of mg/hour = no. of ml/hour.★

Lignocaine

- Use 2% preparation for intravenous use without adrenaline (eg. xylocard, gesticard)
- Loading dose — initial bolus of 1.5 mg/kg (75-100 mg), followed 15 min. later by second bolus of half this quantity.
- Maintenance infusion — to be started with first loading dose — Add 50 ml of 2% lignocaine (1 g) to 500 ml of 5% dextrose (40 ml to be discarded from pint). This gives a concentration of 2 mg/ml.★

This is to be run at a rate of 1 mg (0.5 ml) to 4 mg (2.0 ml) per minute as needed. Solution should be made every 24 hours. If the larger dose is

required, 2 g of lignocaine (100 ml of 2% sol) may be added to 400 ml to give concentration of 4 mg/ml. Lower doses are indicated in patients with CCF and liver failure.

Dopamine

- Infusion solution — Add 400 mg Dopamine to 500 ml of N-saline or 5% dextrose. This gives a concentration of 0.8 mg/ml★ or 800 microgram/ml.★
- Solution should be made fresh every 24 hours.
- Dose used: 2-10 microgram/kg/min. — Beta-adrenergic effect
10-20 microgram/kg/min. — Alpha-adrenergic effect

If large doses are required 800 mg of dopamine may be added to 500 ml, giving a concentration of 1.6 mg/ml or 1600 microgram/ml. This will minimise the volume of fluid infused. Do not combine with Sodium bicarbonate. Avoid extravasation as it can cause tissue necrosis.

★ With a regular drip set, 1 ml = 15 drops/min; with a microdrip set, 1 ml = 60 drops. Hence 1 ml/min = 15 drops/min, with the usual drip set or 60 drops/minute with a microdrip set. The latter are useful when small volumes (0.25 – 0.5 ml/min.) have to be used.

DRUGS UNDER SPECIAL CIRCUMSTANCES

There are many situations, when special care has to be exercised while prescribing drugs. Among them are

1. age — children and elderly
2. pregnancy
3. breast-feeding
4. hepatic disease
5. renal disease

Caution must be exercised in all these situations so that the risks can be reduced.

Children

Children differ from adults in the response to drugs. This is especially so in the neonatal period. The risk of toxicity is greater in children because of

1. deficient metabolic processes,
2. inefficient renal clearance,
3. different organ sensitivities, and
4. inadequate detoxifying systems

Prescriptions should always state the age of the child.

Some drugs are contra-indicated in children. In other instances, the dose of the drug may have to be adjusted individually or based on weight, age or surface area of the child. Oral preparations are usually given by spoon and hence, the parents must be instructed in the use of the appropriate spoon.

Medicines should not be added to the contents of the infant's feeding bottle. The drug may interact with milk or the infant may not drink all the milk.

Elderly

Older patients may receive multiple drugs for various diseases or symptoms, increasing the danger of interactions. Many diseases are psychosomatic; drugs are a poor remedy.

The absorption, metabolism and excretion of drugs are altered in old age. There may be decrease in metabolism in the liver as also decreased renal clearance. The bound portion of the drug may be reduced because of less proteins. All these can produce increase in plasma or tissue concentration.

The questions to be asked are

1. Does this patient really require the drug?
2. What should be the dose initially? Usually it will be less than that recommended for the younger patient.
3. What should be the maintenance dose? Often, it is significantly less than for the younger subject.
4. Are there acute episodes of intercurrent illness, with dehydration and decrease in renal clearance?

Adverse reactions occur commonly to hypnotics (they often have plasma half-lives of 30 hours or more), diuretics, drugs used in parkinsonism and hypertension, and psychotropics.

Patient compliance may be poor in older patients. The instructions must be explicit and simple, the containers must be marked clearly and drug regimens should be simplified.

Pregnancy

All drugs are better avoided in pregnancy, especially during the first trimester. We seldom ask the patient whether she is pregnant. Drugs should be prescribed only if absolutely essential and that too in the smallest effective dose. Some drugs are absolutely contra-indicated.

Drugs to be avoided or used with caution in pregnancy (examples)

1. Alimentary tract

Stimulant laxatives — Avoid during pregnancy.

Sulphasalazine — avoid during 3rd trimester.

2. Cardiovascular System

Diuretics: Avoid during third trimester (to treat hypertension).

Thiazides may cause thrombocytopenia in 3rd trimester.

Antidysrhythmic: Amiodarone — avoid during 2nd and 3rd trimesters.

Antihypertensives: Guanethidine, diazoxide and reserpine — Avoid during 3rd Trimester.

Vasodilators: Nifedipine — avoid during 3rd trimester.

Vasoconstrictors: Metaraminol; Noradrenaline — Avoid during pregnancy.

3. Blood

Anticoagulants: Heparin and oral anti-coagulants — avoid during pregnancy.

Fibrinolytic agents; Streptokinase; urokinase — avoid during pregnancy.

4. Respiratory System

Aminophylline: Avoid during 3rd trimester.

Salbutamol: Reduce dose during 3rd trimester

5. Central Nervous System

Hypnotics & sedatives: Avoid during 3rd trimester. Avoid alcohol.
Barbiturates — avoid during 3rd trimester. Benzodiazepenes — avoid large doses.

Antipsychotic drugs: Lithium — Avoid during pregnancy

Phenothiazine derivatives — Avoid during 3rd trimester.

Anti-depressants: Tricyclics: Avoid

6. Analgesics & anti-inflammatory

Aspirin, Indmethacin, Naproxen — Avoid during 3rd trimester.

Narcotics: Dextropropoxyphene, diamorphine and pentazocine — Avoid during 3rd trimester.

Antimigraine: Ergotamine — Avoid during pregnancy.

Phenytoin, Phenobarbitone — congenital malformation possible.

Sodium valproate — avoid during first trimester.

7. Anti-bacterial

Aminoglycosides: Risk of auditory or vestibular damages, greater with streptomycin, kanamycin.

Chloramphenicol, dapsone, Rifampicin, Sulphonamides; avoid during 3rd trimester.

Tetracyclines: Avoid during 2nd and 3rd trimester

Trimethoprim: Avoid during 1st trimester

8. Antimalarials: (Benefit outweighs risk)

Avoid, if possible, primaquine during 3rd trimester and pyrimethamine and quinine during 1st trimester.

9. Endocrine System

Oral hypoglycaemics: Substitute insulin during 3rd trimester.

Antithyroid: Carbimazole, iodine, prophythiouracil — use with caution during 2nd and 3rd trimester.

Radioactive iodine — Avoid.

10. Sex hormones

Androgens, oestrogens, progestogens (high dose) — avoid.

11. Skin

Povidone — iodine — avoid during 2nd and 3rd trimester.

12. Vaccines

Live vaccines may produce congenital malformation during 1st trimester.

13. Anaesthetics: Inhalation and intravenous anaesthetics can depress neonatal respiration during 3rd trimester.

Local anaesthetic-Procaïne: neonatal methaemoglobinaemia during 3rd trimester.

Neostigmine-3rd trimester: neonatal myasthenia gravis with large doses.

Breast — feeding

Drugs administered to a nursing mother may cause toxicity to the infant. Only very essential drugs should be given to lactating mothers. Again some drugs are absolutely contraindicated.

Drugs to be avoided or to be used with caution in breast feeding (examples)

1. Alimentary system

- i. Atropine: Avoid, if possible.
- ii. Laxative: Anthroquinones, phenolphthalein — avoid.

2. Cardiovascular System

- i. Amidarone: Avoid
- ii. Beta — adrenoceptor blockers: monitor infant.

3. Blood Oral anticoagulants: Risk of haemorrhage.

4. Respiratory System

- i. Aminophylline: Irritability in infants.
- ii. Cough mixtures containing iodides: use alternative cough mixtures.

5. Central nervous System

- i. Hypnotics & sedatives: Avoid alcohol, barbiturates, benzodiazepens, bromide, chloral hydrate, meprobamate.
- ii. Antipsychotics: Haloperidol, phenothiazines and lithium salts — monitor infant.
- iii. Antimigraine: Ergotamine — avoid, if possible.
- iv. Anti-epileptics: Phenobarbitone; primidone — Avoid, when possible.

6. Narcotic Analgesics: Diamorphine, morphine and methadone — withdrawal symptoms occur in infant.

7. Anti-infective: Chloramphenicol — may cause bone-marrow toxicity in infant. Dapsone — slight risk of haemolytic anaemia in infant. Nalidixic acid — may cause haemolytic anaemia. Isoniazid — risk of convulsions and neuropathy. Metronidazole bitter taste to milk. Penicillins — Possibility of hypersensitivity in infant. Sulphonamides & cotrimoxazole—monitor infant. Tetracyclines — avoid.

8. Endocrine System

- i. Antidiabetic: Oral hypoglycaemics—possibility of hypoglycaemia in infant.
- ii. Antithyroid: Carbimazole; iodine: danger of hypothyroidism or goitre. Iodine is concentrated in milk. Propylthiouracil: monitor infant. Radioactive iodine — stop breast feeding on therapeutic doses; withhold for 24 hours after diagnostic doses.
- iii. Thyroid hormone: liothyronine; thyroxine — use with caution.
- iv. Corticosteroids: monitor carefully.
- v. Sex hormones: High doses of oestrogen and progestogens suppress lactation.
- vi. Bromocriptine: Suppress lactation.

9. Nutrition: Calciferol; thiamine; vitamin A — caution.
10. Musculoskeletal System: Colchicine, gold, phenylbutazone — use with caution.

Diseases of the liver

Drugs must be kept to the minimum in all patients with liver disease; if essential, they must be administered with caution. Hepatotoxicity of drugs may be dose related or idiosyncratic.

Drugs to be avoided or used with caution in liver disease (examples)

1. Alimentary System
 - i. Antacids: Avoid those which contain large amounts of sodium, when there is fluid retention.
 - ii. Antiulcer: Cimetidine can cause confusion states occasionally.
2. Cardiovascular System
 - i. Diuretics: Bumetanide, ethacrynic acid, frusemide, and thiazides can cause hypokalaemia and precipitate coma.
 - ii. Anti-dysrhythmics: Avoid or reduce lignocaine, and verapamil.
 - iii. Anti-hypertensives: Avoid methyldopa and sodium nitroprusside.
3. Blood: Avoid oral anticoagulants.
4. Respiratory System
 - i. Aminophylline: Reduce dose.
 - ii. Antihistaminics: Avoid.
 - iii. Antitussives: Avoid those containing opiates.
5. Central Nervous System
 - i. Hypnotics / Sedatives: All can precipitate coma.
 - ii. Antipsychotics: Chlorpromazine is hepatotoxic.

- iii. Antidepressants: Monoamine oxidase inhibitors may cause idiosyncratic hepatotoxicity.
 - iv. Drugs in nausea: Avoid antihistaminics and phenothiazines.
 - v. Antimigraine: Avoid ergotamine.
 - vi. Antiepileptics: Phenobarbitone and primidone may precipitate coma. Reduce dose of phenytoin. Avoid sodium valproate.
6. Analgesics.
Ibuprofen and phenylbutazone increase risk of gastrointestinal bleeding and fluid retention.
Avoid aspirin, narcotics and large doses of paracetamol.
7. Anti-infective drugs
Anti-bacterial: Avoid Chloramphenicol: Increased risk of bone marrow depression. Clindamycin — reduce the dose. Erythromycin stolate can cause idiosyncratic cholestatic hepatotoxicity.
Isoniazid — Idiosyncratic.
Pyrazinamide — Avoid or use with caution.
Penicillins: caution.
Rifampicin — Avoid or reduce dose.
Tetracyclines — Avoid.
8. Endocrine System
- 1) Antidiabetic: Metformin — Avoid. Sulphonylureas — Chlorpropamide and tolbutamide — Avoid.
 - 2) Corticosteroids: Prednisolone — Side effects are seen. Prednisolone is preferable to prednisone.
 - 3) Sex hormones: Androgens and anabolic steroids — methyltestosterone — Avoid.
 - 4) Hypothalamic hormones: Avoid Clomiphene.

Diseases of the Kidney

Toxicity can be produced by the inability of the kidney to excrete the drug or its metabolites. Some drugs are not effective in renal impairment. Nephrotoxic drugs must be avoided, as far as possible. The dose of the drug must be monitored individually to take care of the renal impairment (glomerular filtration rate). The serum creatinine concentration can be used as a rough guide.

Drugs to be avoided or used with caution in renal impairment (examples)

1. Alimentary System

- i. Antacids: Avoid those with high sodium content. Avoid magnesium salts.
- ii. Antispasmodics: Avoid metaclopramide (extrapyramidal reactions).
- iii. Ulcer-healing drugs; Avoid Carbenoxolone. Reduce dose of cimetidine and ranitidine.
- iii. Antidiarrhoeals; Sulphasalazine — ensure high fluid intake.
- v. Laxatives; Avoid those with high sodium content.

2. Cardiovascular System

- i. Cardiac glycosides: Digitoxin and digoxin — reduce dosage.
- ii. Diuretics: Avoid amiloride, ethacrynic acid and thiazides. Bumetanide and frusemide may need high doses. Aldosterone and antagonists: monitor plasma K.
- iii. Antidysrhythmics: Disopyramide and procainamide — Avoid or reduce dose.
- iv. Beta-adrenoceptor blockers: Reduce dose.
- v. Antihypertensives: Guanethedine — Avoid.
Captopril — reduce dose. Hydralazine, methyl dopa, prazosin: start with small dose. Sodium nitroprusside — avoid prolonged use.

3. Central Nervous System
 - i. Hypnotics and sedatives — start with small doses.
 - ii. Antipsychotics: Avoid lithium if possible.
 - iii. Antimigraine: Avoid ergotamine.
 - iv. Anti-epileptics: Phenobarbitone, Primidone — Avoid large doses.
 - v. Antiparkinsonism: Avoid amantadine.
4. Analgesics
Avoid ibuprofen, phenylbutazone, aspirin, narcotics and large doses of paracetamol.
5. Endocrine System
 - i. Antidiabetics: Avoid metformin and sulphonylureas.
 - ii. Antithyroid drugs: Propylthiouracil — reduce dose.
6. Anti-infective drugs
 - i. Anti-bacterial: Aminoglycosides — amikacin, gentamicin, kanamycin, netilmycin, streptomycin, tobramycin — reduce dose. Avoid neomycin. Antituberculous drugs: Ethambutol, isoniazid — reduce dose; cycloserine — avoid; Cephalosporins — reduce dose; avoid cephaloridine and cephalothin. Penicillins: Amoxycillin, ampicillin, carbenicillin — reduce dose. Benzylpenicillin — Max. 6 g. daily.
7. Urinary antimicrobial drugs: Avoid nalidixic acid, nitrofurantoin and chloramphenicol. Colistin — reduce dose. Cotrimoxazole — Max. 960 mg daily. Avoid lincomycin, sulphadiazine and tetracyclines; other sulphanamides — ensure high fluid intake. Trimethoprim — reduce dose. Vancomycin — avoid.
8. Antifungal: Amphotericin — avoid. Flucytosine — reduce dose. Anthelmintics: Piperazine — reduce dose.

9. Drugs used in rheumatic disease: Anti-inflammatory analgesics — see central nervous system. Chloroquine — reduce dose or avoid. Penicillamine — avoid.
10. Drugs used in gout: Allopurinol — reduce dose. Colchicine — avoid.
11. Eye: Acetazolamide — avoid.
12. Anaesthetics: neuromuscular blocking drug. Gallamine — avoid. Alcuronium, pancuronium, tubocurarine — reduce.

RATIONAL USE OF DRUGS

Medicines have a potent role in the maintenance and restoration of health. They can be hazardous, if improperly used. Every drug carries with it a certain amount of risk.

There are over 60,000 formulations of drugs in India today. This compares with about 3,000 formulations in the Scandinavian countries. They restrict the number of formulations. In India, there is continuous flooding of the market with costly, hazardous and irrational drugs. It is estimated that over 20% of the drugs in the country are substandard or spurious.

Medicines should be prescribed and taken only when they are needed. This may sound too elementary but how often are medicines administered unnecessarily! The benefit of administering the medicine should outweigh the risks involved.

The drug must be used in a rational way — dose, form, total duration.

We must have precise scientific information about the drugs we prescribe. The glossy leaflets often conceal information rather than reveal information. Sometimes the companies feed us with semiscientific data. So-called research is sometimes carried out with liberal payments by the firm. The results may be tutored and, when adverse, suppressed. We must ask for really scientific data. The manufacturers and their representatives must be asked to give us full information regarding the real indications, contra-indications, special precautions, side effects, adverse reactions, possible interactions and the dosage, together with cost for the entire treatment.

Understanding the mechanism of action helps in the rational use of drugs; eg., in pain: the non-steroidal anti-inflammatory agents produce their effects by inhibition of prostaglandin synthesis. The choice would then depend on the toxic side effects obtained from a combination of these agents; combinations often induce enhancement of the toxic effects. There is also no extra benefit by increasing the dose of the chosen drug above the optimum amount.

Often a non-steroidal anti-inflammatory agent is combined with an antispasmodic. The pain, if due to spasm of the hollow viscera, requires an antispasmodic like atropine or belladonna for relief; there is no role for the analgesic.

Cost: The cost does not reflect quality. Many companies spend much more money on promotion of the drug than on quality assurance or research.

Non-drug therapies: Whenever possible, we should use acceptable non-drug therapies, eg., in cases of fever, tepid sponging or cold sponging may be sufficient and can do away with the drugs or reduce the dosage or frequency of administration of the antipyretics. The same procedure can be adopted for pain and other symptoms.

How to choose a drug

From among the many tens of thousands of drug formulations it is necessary to choose the appropriate drugs. This will depend on many factors such as the morbidity pattern in the area and availability of the drug. There are certain principles in general, which must be kept in mind.

- (1) The drug must be *indicated* for the particular condition: preventive, curative or symptomatic relief.
- (2) It must be *effective*. The drug must be able to produce the intended effect, when administered in the right dose, form, route of administration, dose interval and duration of treatment, modifying favourably the clinical course. Ineffective drugs are not only useless; they can be positively harmful as they produce a false sense of security, allow resistance to develop, allow other organisms to grow or mask the signs and symptoms of the disease.
- (3) It must not be *hazardous*. There are drugs which have unacceptably high unfavourable benefit/risk ratio. Safety, according to the purpose, is a very important criterion in the choice.
- (4) Its use must be *rational*, with a demonstrated clinical efficacy, for the defined situation. A drug which may be used in a male adult may be

totally unwarranted in a pregnant person or a child or the elderly or in the presence of liver and kidney disease. Drugs of proven efficacy and safety individually, might be irrational when combined.

- (5) Product *quality* must be assured. This is done by good manufacturing processes and quality control at every stage by analyses and tests. We have far too many substandard and spurious drugs in the market. It is estimated that in our country, there are nearly 10,000 manufacturing units, large and small, most of them with inadequate quality control mechanisms. Just going by brand name or the manufacturer's name does not ensure quality.
- (6) The drug must be economical. When more than one drug or formulation, satisfying the various criteria are available, the cost-effective one must be chosen.
- (7) Full scientific information must be available.
- (8) The drug must be stable under ordinary conditions of storage and should have long shelf-life.

Fixed dose formulations

Fixed dose formulations of drugs have irresistible appeal. It is shotgun therapy, in the hope that one or more of the ingredients might be useful or that they might have complementary or even synergistic effects. Such formulations which were popular seem to be on the way out, with more rational and discriminating prescribing. In Japan, very few of the new products are fixed ratio combinations; in India we still have a huge number of fixed dose combinations. The long list of these combinations shows

- (1) Inability to critically diagnose and evaluate therapy,
- (2) Exploitation by the drug industry, and
- (3) Gullibility of the public, especially with respect to tonics, vitamins and nutritional formulations.

Advantages claimed for fixed-dose formulations:

- (1) Improved compliance in situations where more than one drug is to be taken, e.g., hypertension. Even here, there can be problems; beta-blocker in a hypertensive who is also an asthmatic.
- (2) Synergism; the best example is Co-trimoxazole. Recent studies question this. Some patients show hypersensitivity to the sulphonamide content. Trimethoprim, by itself, avoids this hypersensitivity and has shown greater efficacy in the treatment of urinary tract infection.
- (3) Enhancement of therapeutic efficacy, like decarboxylase inhibitors and levodopa in parkinsonism or ampicillin and probenecid in gonorrhoea.
- (4) Decrease in bacterial resistance as in multi-drug treatment of tuberculosis.
- (5) Reduction in side effects as when pyridoxine is combined with isoniazid to prevent peripheral neuropathy.
- (6) Reduction in cost, in some cases.

Disadvantages are many:

- (1) Lack of flexibility in adjusting dosage. The effective dose of a drug varies from person to person and with the diseased state. Often the dose of the individual drug has to be adjusted — increased or decreased to obtain the optimum result.
- (2) The combinations are often irrational, e.g., benzodiazepines plus analgesics and anti-inflammatory steroids.
- (3) Very often, some of the components are unnecessary, e.g., fixed dose combinations of vitamins. The requirements of the vitamins should be determined for a particular deficiency.
- (4) The pharmacokinetics of the drugs may be incompatible. The biological half-lives of the components may be very different, affecting the availability and concentration of the drug.

- (5) Risk of interaction and toxicity. Such problems become more and more when the number of drugs in one preparation increases.
- (6) Ignorance of the true contents.
- (7) Many of the fixed dose formulations contain ingredients in quantities lower than therapeutically necessary, making them useless and even harmful.

The use of fixed-dose formulations is not justified in almost all situations and is better avoided for better patient care.

ADVERSE DRUG REACTIONS

Modern drugs are powerful. If used with skill, caution and wisdom, they are highly beneficial. But they can lead to many serious adverse reactions.

Every drug has some risk. It is important to be always on the look-out for adverse effects.

Newer drugs are being marketed all the time. New adverse reactions reported with more extensive use are not given enough publicity. Adverse reactions or unexpected outcome, however minor, should be watched and reported.

Most of the adverse reactions are manifest immediately or within a few days of administration. But some can be delayed very much. Chloroquine given to pregnant mother can produce retinopathy in the child 4-5 years after delivery. Diethylstilboestrol given in early pregnancy may produce, many years later, carcinoma in her adolescent daughter.

Report all serious, suspected reactions to drugs, even if the toxic effects are well recognised. This will enable comparisons of risk/benefit ratios. When there is congenital abnormality in the infant or foetus, all drugs taken by the mother during pregnancy should be reported.

Adverse reactions may be reduced by certain procedures:

1. Never use a drug unless there is a definite indication.
2. Prescribe as few drugs as possible and give clear instructions.
3. Never use a drug in the pregnant women, unless it is absolutely essential.
4. Ask the patient if he/she had previous reactions to drugs.
5. Age, hepatic disease and renal disease may alter the metabolism of drugs and require dose adjustments.
6. Use drugs with which you are familiar.

7. When you prescribe a new drug, caution the patient to watch for and report any adverse reaction.

If you notice any adverse drug reactions or wish for information on them, please write to

Clinical Pharmacology Unit and ADR monitoring Centre,
C.M.C. Hospital, Vellore 632 004, T.N.

DRUG INTERACTIONS

When two or more drugs are given at the same time they may act independently or may interact with each other. The result of this interaction may be potentiation or antagonism of one drug by the other, or occasionally, an unrelated effect. Drug interactions are on the increase due to multiple drug therapy. About 7% of all adverse drug reactions result from drug interactions, and 4% of all deaths due to adverse drug reactions are a consequence of drug interactions.

Pharmacodynamic reactions occur between drugs that have similar or antagonistic pharmacological effects or side effects. This could be due to competition occurring at receptor sites or due to drugs acting on the same physiological system. These are usually predictable, and there could be similar reactions with drugs belonging to the same group.

Pharmacokinetic interactions occur when one drug alters the absorption, distribution, metabolism or excretion of another, thus increasing or reducing the amount of drug available to produce its pharmacological effects. These interactions are not easily predictable, and many of them affect only a small proportion of patients who are taking the combination of drugs.

Interactions affecting Drug Absorption

Drug interactions can alter either the rate of absorption or the amount of the drug absorbed. Delayed absorption may result in a time lag in reaching peak plasma concentrations, and this reduction of the amount absorbed may lead to ineffective therapy.

Interactions due to changes in protein binding of drugs

Most drugs are loosely bound, to a variable extent, to plasma proteins. Protein binding sites are non-specific and one drug can be displaced by another, thereby increasing the proportion of the free drug that diffuses out of the plasma into the sites of action. This can produce a detectable increase in effect only if the drug is more than 90% bound, and is not widely distributed within the body. Even for such drugs, displacement rarely produces more than a transient potentiation, because of the

increased rate of elimination, which tends to restore the free drug concentration to its original level.

Interactions affecting Drug Metabolism

One drug can increase the rate of metabolism of another by enhancing the activity of the enzyme system in the hepatic microsomes. This results in lower plasma concentrations and a reduction of the drug effects. If the drug that stimulates the enzyme activity is withdrawn, plasma concentrations can increase, and toxicity can occur.

Sometimes inhibition of drug metabolism due to interactions can result in a higher plasma concentration of the drug enhancing the effect and increasing the risk of toxicity.

Interactions affecting renal excretion of drugs

Drugs are eliminated by the kidney by both glomerular filtration and by active tubular secretion. Competition occurs between drugs that share active transport mechanisms in the proximal tubules.

RELATIVE IMPORTANCE OF INTERACTIONS

Serious drug interactions occur mostly with drugs of a small therapeutic ratio, (effective levels: toxic levels) and with those where the dose must be carefully controlled according to response. Elderly patients and those with impaired renal and hepatic function are more prone to drug interactions.

When multiple drug therapy is being considered, it is essential to be aware of drug interactions and the consequent potential for ineffective therapy, or toxic reactions.

SOME CLINICALLY IMPORTANT DRUG INTERACTIONS

Drug affected	Drug interacting	Effect
1. Gastrointestinal System		
Carbenoxolone	Amiloride, Spironolactone	Inhibition of ulcer healing.
Cimetidine	Antacids	Reduced absorption if taken simultaneously.

Drug affected	Drug interacting	Effect
Metoclopramide	Anticholinergic drugs such as atropine, benzhexol, propantheline; narcotic analgesics.	Antagonism — they have opposing effects on gastrointestinal activity.

2. Cardiovascular system:

Anti-arrhythmic drugs	Any combination of two or more	Increased myocardial depression.
Disopyramide	Potassium Salts	Hyperkalaemia.
	Amidorone	Increased risk of ventricular arrhythmias due to prolongation of QT interval.
Lignocaine, mexiletine, Tocainide	Diuretics — bumetanide, ethacrynic acid, frusemide, thiazides.	Antagonised by hypokalaemia.
Lignocaine	Cimetidine, Propranolol	Increased risk of lignocaine toxicity.
Verapamil	Beta-adrenoceptor blocking drugs	Asystole, hypotension.
Antihypertensive drugs		
Captopril	Anti-inflammatory analgesics such as indomethacin, phenylbutazone; carbenoxolone, corticosteroids, corticotrophin; oestrogens, oral contraceptives.	Reduced effects.
	Alcohol, antidepressants, hypnotics, sedatives, tranquillisers; fenfluramines; levodopa; vasodilators such as nitrates, nifedipine; verapamil	Potentialiation.

Drug affected	Drug interacting	Effect
	Potassium supplements, Potassium sparing diuretics	Hyperkalaemia.
Clonidine	Beta-adrenoceptor blocking drugs	increased risk of clonidine withdrawal hypertension.
Beta-adrenoceptor blocking drugs	Indomethacin	Antagonism of anti-hypertensive effect
	Nifedipine	Severe hypotension and heart failure occasionally.
	Prenylamine	Increased myocardial depression.
	Sympathomimetic amines such as adrenaline, amphetamines, phenylephrine.	Severe hypertension reported.
Labetalol	Cimetidine	Potential possible because of reduced metabolism.
Digoxin and other cardiac glycosides	Carbenoxolone; diuretics- bumetanide, ethacrynic acid, frusemide, thiazides	Increased toxicity.
	Cholestyramine, colestipol	Reduced absorption.
	Phenobarbitone, rifampicin	Inhibition (Digitoxin only)
Digoxin	Amiodarone, quinidine, quinine	Potential. Halve maintenance dose of digoxin.
	Nifedipine, verapamil	Potential may occur.
Diuretics	Anti-inflammatory analgesics such as indomethacin.	Antagonism.
	Carbonoxolone, corticosteroids, corticotrophin; oestrogens.	Hypokalaemia.
Aldosterone antagonists Amiloride, Trimerterene	Captopril, potassium supplements, trilostane	Hyperkalaemia.

Drug affected	Drug interacting	Effect
Heparin	Aspirin, Dipyridamole	Potentialiation.
Adrenaline, Noradrenaline	Beta-adrenoceptor blocking drugs	Potentialiation of hypertensive effect.

3. Respiratory System

Theophylline	Cimetidine, erythromycin, influenza vaccine, oral contraceptives.	Potentialiation.
	Carbamazepine, Phenytoin, rifampicin, sulphinoprazone	Plasma concentrations of theophylline may be reduced.

4. Central Nervous System

a) Analgesics

Aspirin	Metoclopramide	Potentialiation.
Ketoprofen, Naproxen	Probenecid	Increased plasma concentration.
Paracetamol	Cholestyramine	Reduced absorption.
	Metoclopramide	Potentialiation.

b) Antiepileptics

General	Tricyclic anti depressants oral contraceptives	Increased seizure activity.
Carbamazepine	Cimetidine, dextropropoxyphene, erythromycin, isoniazid.	Potentialiation.
Ethosuximide	Carbamazepine	Reduced plasma concentrations of ethosuximide.
	Phenytoin, sodium valproate	Increased plasma concentrations of ethosuximide.
Phenobarbitone, Primidone	Phenytoin, sodium valproate	Increased sedation Increased blood levels of phenobarbitone

Drug affected	Drug interacting	Effect
c) Psychotropic drugs		
Hypnotics and sedatives	Alcohol, antidepressants antihistamines, narcotic analgesics	Potentialiation
Tricyclic antidepressants	Alcohol	Potentialiation of sedative effect.
	Oral contraceptives	Reduced effect.
	Phenothiazine derivatives	Increased side effects.
Imipramine	Cimetidine	Potentialiation
Lithium	Diuretics, diclofenac, indomethacin, phenylbutazone	Potentialiation.
	Acetazolamide, aminophylline, sodium bicarbonate	Increased lithium excretion.
	Haloperidol	Increased risk of extrapyramidal effects.

5. Infections

Aminoglycosides, eg., Gentamicin etc.	Ethacrynic acid, frusemide skeletal muscle relaxants	Increased ototoxicity; Increased neuromuscular blockade.
Cephaloridine, Cephalothin, and other cephalosporins	Ethacrynic acid, Frusemide	Increased nephrotoxicity.
Cephmandole, Latamoxef	Alcohol	'Antabuse' reactions.
Chloramphenicol	Phenobarbitone	Reduced plasma concentrations of chloramphenicol and increased levels of phenobarbitone.
Dapsone	Probenecid	Reduced excretion — increased side effects.
Griseofulvin	Phenobarbitone	Impairs absorption.

Drug affected	Drug interacting	Effect
Ketoconazole	Antacids, anticholinergic drugs, cimetidine, ranitidine.	Decreased absorption.
Metronidazole	Alcohol	'Antabuse' reaction.
Tetracyclines	Antacids, dairy products, oral iron, sucralfate, zinc sulphate.	Reduced absorption.

6. Endocrine system

Antidiabetic drugs	Alcohol	Antabuse like reaction
	Beta-adrenoceptor blocking drugs; monoamine oxidase inhibitors.	Potentialiation.
	Corticosteroids, corticotrophin; diazoxide; diuretics-bumetanide, frusemide, thiazides; oral contraceptives	Antagonism.
Metformin	Alcohol	Increased risk of lactic acidosis.
Corticosteroids, corticotrophin	Carbenoxolone; diuretics bumetanide, ethacrynic acid, frusemide, thiazides.	Increased potassium loss.
Cortisone, dexamethasone, hydrocortisone, Prednisolone, Prednisone	Barbiturates, carbamazepine, phenytoin, primidone, rifampicin	Reduced effect.

7. Gynaecology

Oral contraceptives	Barbiturates, carbamazepine, dichlorophenazone, phenytoin, primidone, rifampicin.	Reduced effect.
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Drug affected	Drug interacting	Effect
	Oral antibiotics such as ampicillin, tetracycline	Reduced effect-risk probably small.

8. Malignant disease and Immunosuppression

Azathioprine Mercaptopurine	Allopurinol	Potential-increased toxicity.
Cyclosporin	Ketoconazole	Increased plasma concentrations of cyclosporin.
Methotrexate	Aspirin, Phenylbutazone, Probenecid	Delayed excretion-increased toxicity.
	Antiepileptics; co-trimoxazole, pyrimethamine	Increased anti-folate effect.

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1. ALIMENTARY SYSTEM

1.1 ANTACIDS AND ULCER HEALING DRUGS

Antacids react with gastric acid and lower the acidity of gastric content. They produce symptomatic relief of both ulcer and nonulcer dyspepsia and reflux oesophagitis. They are best given when symptoms occur or are expected, usually between meals and at bed time, four or more times daily. Magnesium and aluminium containing antacids are suitable for most antacid purposes. Magnesium containing antacids tend to be laxative, whereas aluminium containing antacids may be constipating. These should not be taken along with anticholinergic drugs, corticosteroids, tetracyclines, iron, etc., as they impair their absorption. Indiscriminate use of antacids can lead to metabolic alkalosis.

Bismuth salts and sucralfate, though used for gastric and duodenal ulcers have minimal antacid properties. They act by protecting the mucosa from acid-pepsin attack. Bismuth salts are known to cause black discolouration of tongue and face and also encephalopathy. Hence their use should be restricted to short course; they have limited usefulness.

H₂ receptor antagonists, cimetidine and ranitidine, heal peptic ulcers by reducing gastric acid output. They may also relieve heartburn in peptic oesophagitis and in high doses reduce gastric acid output in Zollinger — Ellison syndrome. Given prophylactically they reduce the frequency of bleeding from gastroduodenal erosions in patients with fulminant hepatic coma. Use of these drugs in undiagnosed dyspepsia may be justified in younger patients, but is undesirable in older uninvestigated patients because the diagnosis of gastric cancer may be delayed. Treatment is best given in courses of 4–8 weeks with further short courses if symptoms recur. The main problem with cimetidine is the high rate of relapse after treatment is discontinued. Surgery may be required when relapse is frequent. Maintenance treatment is indicated when recurrences are severe and frequent and where because of age or concomitant disease, surgery is contraindicated. Drug interactions and reactions with ranitidine are considered to be much less than with cimetidine. Cimetidine is known to cause gynecomastia.

Selective antimuscarinics, eg., pirenzepine and carbenoxolone, a synthetic derivative of glycyrrhiza are also effective ulcer healing agents. The latter should be used with caution in elderly because it can aggravate hypertension and cardiac failure. Carbenoxolone is known to have mineralocorticoid effect and may cause sodium retention.

1.1.1 ALUMINIUM AND MAGNESIUM

containing antacids with or without additional ingredients.

Indication : Ulcer and non-ulcer dyspepsia; reflux oesophagitis.

Prep/Route/Dose : Tab: 1-2
Suspension: 10-20 ml in between meals and at bed time.

S.P. & C.I. : Magnesium containing antacids tend to be laxative whereas aluminium containing antacids may be constipating.
: Avoid taking at same time other drugs as it may impair their absorption.
: Avoid magnesium containing antacids in patients with renal impairment.

Brands/Cost

ANTACID TABLET : Tab: 250 mg: Rs. 85.00 for 1000
(CMS-I)

GELUSIL MPS : Tab : Rs. 1.41 for 10
(Warner) Liquid: Rs. 9.71 for 170 ml.

DIGENE : Tab: Rs. 1.05 for 8
(Boots) Gel: Rs. 7.77 for 210 ml

MUCAINE : Gel: Rs. 12.11 for 175 ml
(Wyeth)

DIOVOL : Tab : Rs. 6.10 for 50
(Wallace) Suspension: Rs. 8.68 for 175 ml

ZYMETS : Tab : Rs. 1.40 for 10
(Parke-Davis) Liquid: Rs. 7.50 for 170 ml

1.1.2 ALUMINIUM ONLY PREPARATION

ALUMINIUM HYDROXIDE

Indication : Dyspepsia
As phosphate-binding agent in management of chronic renal failure.

Brand/Cost

ALUDROX : Tab : Rs. 6.70 for 50
(Wyeth) Gel : Rs. 7.32 for 350 ml
Dose: 1 tab or 15-30 ml, 4 times a day.

1.1.3 ANTACID MIXTURE

MAGNESIUM TRISILICATE MIXTURE

Mag. Trisilicate	5g
Light mag. carbonate	5g
Sod. bicarbonate	5g
Peppermint water to make	100ml

Dose: 15ml per dose

1.1.4 H₂-RECEPTOR BLOCKING DRUGS

1.1.4.1 CIMETIDINE D I R H P L

Indication : Benign gastric and duodenal ulceration; stomal ulcer; reflux oesophagitis; Zollinger-Ellison syndrome; non-ulcer dyspepsia; other conditions where gastric acid reduction is beneficial.

As prophylactic to reduce frequency of upper G.I. bleeding in stress situations and as a prophylactic for acid (aspiration).

Prep/Route/

Dose

: Tab : 200mg; 400mg;
Dose: 400mg bd or 800 mg hs for healing of ulcer:
4-8 weeks.

Maintenance - 400mg hs

Inj :Amp: 100mg/ml

Dose: 200-400mg, I.V. Q.8.h.

S.E. : Gynaecomastia; rarely impotence. In elderly or very ill,
may cause confusion.

Rarely acute pancreatitis, thrombocytopaenia and
interstitial nephritis.

S.P. : Caution in impaired renal and hepatic function,
pregnancy and lactation.

Brands/Cost

TAGAMED : Inj: 200mg/2ml: Rs. 4.50 for 2ml amp.

(Eskayef) Tab: 200mg Rs. 8.98 for 10

400mg Rs. 17.95 for 10

800mg Rs. 35.90 for 10

1.1.4.2 RANTIDINE D I H R P L

Indication : as for Cimetidine

Prep/Route/

Dose

: Tab : 150 mg

Dose: 150mg BD 4-8 weeks

Maintenance: 150mg HS

Inj : Amp: 25mg/ml

Dose: 50mg I.V. Q.8.h.

S.E., S.P. &

C.I. : As for Cimetidine. Does not have anti-androgenic
effects.

Brands/Cost

ZINETAC : Tab: 150mg: Rs. 19.00 for 10
(Glaxo) 300mg Rs. 36.86 for 10

RANTAC : Tab: 150mg: Rs. 26.00 for 10
(Unique 300mg: Rs. 48.00 for 10
chem) Inj: 50mg/2ml: Rs. 2.84 for 2ml amp.

1.1.4.3 FAMOTIDINE DI H R P L

Indication : as for Cimetidine

Prep/Route/

Dose: Tab: 20mg; 40mg.
40mg hs for 4-8 weeks

SE/SP/CI : as for Ranitidine

Brand/Cost

FAMTAC : Tab: 40mg: Rs. 28.50 for 6.
(Nicholas)

1.1.5 CHELATES & COMPLEXES**1.1.5.1 SUCRALFATE DI R**

Indication : Gastric and duodenal ulcers.

Prep/Route/

Dose : Tab : 1g.
Dose: 1 tab QiD on empty stomach, 1 hour before
each meal and at bed time or 2g BD.

S.E. : Constipation. Gastric discomfort

S.P./C.I. : Avoid concomitant use of antacid; may use ½ hour
before or after.

Caution in impaired renal function.

Brands/Cost

ULCEKON : Tab: 1g: Rs. 13.68 for 10
(FDC)

GELFATE : Tab: 1g: Rs. 21.00 for 10
(Micro Labs)

1.2. DRUGS USED IN NAUSEA AND VERTIGO

Anti-emetics should be prescribed only when the cause of vomiting is known since symptomatic relief may delay diagnosis. The choice of anti-emetic depends on the etiology of vomiting. Hyoscine is the most effective drug for the prevention of motion sickness but because of its adverse effects (drowsiness, blurred vision, dry mouth and urinary retention), it is not tolerated as well as the antihistamines — cyclizine, cinnarazine, dimenhydrinate and promethazine. Of these, cyclizine and cinnarazine are less sedative. Drugs which act on the chemoreceptor trigger zone (metoclopramide and prochlorperazine) are ineffective in motion sickness. Vertigo and nausea associated with labyrinthine disorders can be prevented and treated by hyoscine, antihistamines and prochlorperazine. Betahistine and cinnarazine have been particularly useful in Meniere's disease.

Nausea in the first trimester of pregnancy rarely requires therapy. If hyperemesis occurs, an antihistamine may be required though such use has not been conclusively proven to be safe in pregnancy.

The phenothiazine derivatives — prochlorperazine and trifluoroperazine, in low dose, are drugs of choice in the prophylaxis of emesis associated with uraemia, radiation, extensive cancer, opioid induced vomiting, general anaesthetics and cytotoxic drugs. Severe dystonic reactions have been known to occur especially in children.

Metoclopramide, in addition to its central effect, also has a peripheral action on the gut and therefore may be superior to the phenothiazines in emesis associated with gastro-duodenal and hepato-biliary disease. Acute dystonic reactions occur frequently. Domperidone has been used

with good results in the prevention of cytotoxic drug induced emesis. It does not cross the blood-brain barrier and is therefore least likely to cause sedation or dystonias.

ANTI-EMETIC DRUGS

1.2.1 DOMPERIDONE DI P

Indication : Nausea and vomiting.

Prep/Route/

Dose : Tab : 10mg
Suspension: 1mg per ml
Adults : 20-40mg, 3 times a day

S.E. : Serum prolactin level may rise; galactorrhoea;
gynaecomastia

C.I. : Pregnancy

Brand/Cost

DOMSTAL : Tab : Rs. 9.50 for 10
(Torrent) Suspension: Rs. 5.00 for 30ml

1.2.2 METOCLOPRAMIDE R P DI

Indication : Adults: Nausea and vomiting in G.I. disorders or during chemotherapy and radiotherapy. For radiological examination.
Patients under 20 years: restrict use

Prep/Route/

Dose : Tab : 10 mg
Syrup: 5mg/5ml
Inj : 10mg/2ml amp.
Dose : Oral, IM or IV
5-10mg TID.
Child: 0.5-2.0mg/kg/day in divided doses.
Q.6.h. or Q.8.h.

S.E. : Extra pyramidal signs and symptoms, especially in children, young adults and elderly; tardive dyskinesis; acute hypertensive response in phaeochromocytoma.

Caution : Renal impairment. Elderly, children and young adults, pregnancy. Avoid for 3-4 days following G.I. surgery.

Brands/Cost

MAXERON : Tab : 10mg: Rs. 4.06 for 10
(Wallace) Liquid: 5mg/5ml: Rs. 5.25 for 30ml
Inj : 10mg/2ml: Rs. 2.00 per amp.

PERINORM : Tab : 10mg: Rs. 4.06 for 10
(IPCA) Liquid: 5mg/5ml: Rs. 5.12 for 30 ml
Inj : 5mg/ml: Rs. 2.03 per 2ml amp.

1.2.3 PROCHLORPERAZINE P

Indication : Nausea; vomiting; vertigo; labyrinthine disorders.

Prep/Route/

Dose : Tab : 5mg
Inj : 10.5mg/ml
Dose: Adults 10-30mg daily in divided doses
Injection: 12.5mg deep IM

S.E. : Extrapyramidal symptoms

Brands/Cost

STEMETIL : Inj : 12.5mg/ml: Rs. 40.33 for 10 amp.
(May & Syrup: Rs. 11.02 for 50ml
Baker) Tab : 5mg: Rs. 6.02 for 10
25mg: Rs. 8.75 for 10

1.2.4 PROMETHAZINE

Indication : Nausea and vomiting; labyrinthine disorders; motion sickness; nausea and vomiting of pregnancy.
Extrapyramidal side effects of Metaclopramide.

Prep/Route/

Dose : See under 4.1.4

PHENERGAN . Tab : 10mg: Rs. 0.89 for 10

(M & B) 25mg: Rs. 1.14 for 10

Inj : 2ml. amp.: Rs. 11.50 for 10

Elixir: 5 mg/15 ml: Rs. 6.92 for 125 ml.

1.3 ANTIHAEMORRHOIDAL DRUGS

1.3.1 LOCAL ANAESTHETIC, ASTRINGENT and ANTI-INFLAMMATORY DRUGS

Indication : Pain and bleeding associated with haemorrhoids and anal fissures.

Prep/Route/Dose : Ointment

Suppository

Apply morning and evening and after each defaecation.

Brands/Cost

ANOVATE* : Oint: Rs. 6.50 for 15g.

(Allenbury's)

PROCTOSEDYL* : Oint: Rs. 12.45 for 10g.

(Roussel)

* contains corticosteroids

1.4 ANTISPASMODIC DRUGS

1.4.1 ATROPINE SULPHATE DI

Indication : Reduce intestinal spasm in peptic ulcer, irritable bowel syndrome and diverticular disease.
Reduce smooth muscle spasm.

Prep/Route/Dose : Tab : 0.5mg

Inj : 0.6mg/mg

Dose: 0.25mg to 2mg daily in single or divided doses.
Child: 0.01mg/kg

S.E. : Dry mouth; pupillary dilation with loss of accommodation; increased ocular pressure; bradycardia followed by tachycardia; flushing; dry skin; difficulty with micturition; constipation; rarely fever; rashes; confusional states.

C.I. : Glaucoma

S.P. : Elderly; urinary retention; prostatic enlargement; tachycardia; paralytic ileus; pyloric stenosis; ulcerative colitis.

Brand/Cost

ATROPINE : Inj: 0.6mg/ml: Rs. 38.19 for 50ml.
(Bengal Chem & Pharm.)

1.4.2 BELLADONNA ALKALOIDS

Indication : Relief of smooth muscle spasm.

S.E./S.P./C.I. : As for atropine sulphate.

Brands/Cost

BELLADONNA : Tincture: Rs. 18.60 for 450ml
(National Chemical)

ATABBINE : Belladonna 0.25mg.
(UNI-UCA- Hydroxyzine HCl: 20mg Tab: Rs. 2.31 for 12
UNICHEM

1.4.3 DICYCLOMINE HYDROCHLORIDE

Indication : Relief of smooth muscle spasm.

Prep/Route/Dose : Dicyclomine, 10mg
Dimethyl polysiloxane 40mg

S.E./S.P./C.I. : as for atropine sulphate

Brand/Cost

COLIMEX : Drops: Rs. 6.19 for 10ml.
(Wallace)

1.4.4 HYOSCINE BUTYL BROMIDE

Indication: : Relief of smooth muscle spasm.

Prep/Route/Dose : Tab: 10mg
1-2 tabs, 2-3 times a day
Inj: 20mg/ml 1ml. amp.
1-2 amps, 3 times or as needed IV, IM.

S.E./S.P./C.I. : as atropine sulphate.

Brand/Cost

BUSCOPAN : Tab: 10mg: Rs. 124.78 for 200
(Boehringer- Inj: 20mg/ml: Rs. 42.60 for 20 amp.
Ing)

1.5 LAXATIVES

1.5.1 ISPAGHULA HUSK

Indication : Bulk forming laxative.

Prep/Route/Dose : Granules
2 tsp. in water once or twice daily.

S.E. : Flatulence, abdominal distension.

S.P. : Adequate fluid intake to be maintained; ulcerative
colitis.

C.I. : Intestinal obstruction; colonic atony; faecal
impaction.

Brand/Cost

ISOGEL : Granules: Rs. 18.54 for 100g.
(Allenbury's)

1.5.2 BISACODYL

Indication : Stimulant laxative.

Prep/Route/Dose : Tab : 5mg
Suppository: 10mg
Dose : 1-2 tabs HS; 1 suppository inserted rectally.

S.E. : Suppositories may cause local irritation.
Tablets may cause griping

S.P. : Avoid prolonged use, as it can cause bowel atony and hypokalaemia.
Avoid in children.

Brand/Cost

DULCOLAX : Tab : 5mg: Rs. 30.00 for 100
(German Remedies) Suppository: 10mg: Rs. 9.40 for 5
5mg: Rs. 7.60 for 5

**1.5.3 DIOCTYL SODIUM SULPHOSUCCINATE
(Docusate Sodium)**

Indication : Stimulant laxative and stool softener.

Prep/Route/Dose : Capsules 10 mg
Dose: Adult: 100mg BD or TID
Child: 5mg/kg body weight daily

S.P. : Avoid prolonged use.

Brand/Cost

CELLUBRIL : Capsules: 100mg: Rs. 11.56 for 30
(Astra-IDL)

1.5.4 PARAFFIN

Indication : Stool softener

Prep/Route/Dose : Liquid paraffin.

S.E. : Avoid prolonged use. May cause anal irritation.
Lipoid pneumonia. Interference with absorption of fat soluble vitamins.

S.P. : Avoid combination with phenolphthalein (Rashes, albumin uria, haemoglobin uria)

Brand/Cost

CREMAFFIN : Liquid: Rs. 13.38 for 210ml.
(Boots)

1.5.5 GLYCERINE

Indication : Relieve constipation.

Prep/Route/Dose : Glycerine suppository

Cost : Adult suppository: Rs. 18.50 for 100
Paediatric suppository: Rs. 17.60 for 100

1.6 DIARRHOEA — DRUGS USED IN.

1.6.1 ORAL REHYDRATION SALTS

Indication : Rehydration therapy in all cases of diarrhoea and dysentery and maintenance of hydration.

Prep/Route/Dose : (W.H.O.) salt.

Sodium Chloride	: 3.5g.	Na	: 90 m Eq/L
Potassium Chloride	: 1.5 g.	K	:20 "
Sodium citrate dihydrate	: 2.9 g	Cl	80 "
Glucose (anhydrous)	:20.0 g	Glucose	111 "

Instead of citrate, sodium bicarbonate (2.5g) can be used; glycine and citrate based formula can also be used.

Packets to be made and dissolved in one litre of clear drinking water before use.

Dose: Give as much as the child drinks – usually between 100-200ml/kg/day (atleast 200ml after every loose stool)

Important: Mother must be taught how to frequently administer the solution using a cup or spoon.

Should be started early in diarrhoea.

Nutrition to be maintained.

S.P. : Infants weighing less than 6 kg and those below 6/12 of age: use ORS alternately with breast milk or boiled cooled water.

In neonates use ORS with less sodium.

Renal or hepatic insufficiency, hyperbilirubinaemia.

C.I. : Severe dehydration, shock, peripheral circulatory failure, coma, convulsions, severe vomiting, glucose malabsorption; paralytic ileus; premature infants.

S.E. : Overhydration; peri-orbital oedema; hyponatremia (especially in babies less than 6 kg, if given alone).

Brand/Cost

ORS (W.H.O.) : Make as per composition given.

Alternate with breast feed or water.

1.6.2 ANTI DIARRHOEAL (Symptomatic Drugs)

1.6.2.1 PECTIN-KAOLIN MIXTURE

Prep/Route/Dose : Mixture: Pectin 120mg; Light Kaolin 2g (10ml)
Dose: 10-20ml 3-4 times a day

Brand/Cost

LINOPEL : Suspension: Rs. 6.55 for 100ml.
(TTK)

1.6.2.2 LOPERAMIDE HYDROCHLORIDE

Indication : Acute diarrhoea in adults and children over 4 years.
Chronic diarrhoea.

Prep/Route/Dose : Tab : 2mg
Dose: 2 tabs initially and 1 tab after each loose stool
— max. of 8/day.
Child: 0.05mg/kg/day in divided doses.

S.P./C.I. : Occasional rashes; children below 2 years.

Brand/Cost

LOPAMIDE : Tab: 2mg: Rs. 3.00 for 10
(Torrent)

1.7 MISCELLANEOUS

1.7.1 LACTOBACILLUS

Indication : Imbalanced intestinal flora due to antibiotics and
chemotherapy.
Hepatic encephalopathy.

Prep/Route/Dose : Capsule; ampoule
1capsule or 1 ampoule TID

Brands/Cost

VIZYLAC : Capsule: Rs. 7.89 for 12
(Unichem)

LACTISYN : Oral: Rs. 18.00 for 6 amps.
(Franco India)

1.7.2 NEOMYCIN

Indication : Hepatic encephalopathy
Bowel sterilisation pre-operative.

Details : See 6.3.4.3

1.7.3 CARMINATIVE MIXTURE

The mixture must be freshly prepared.

1.7.4 PREDNISOLONE RETENTION ENEMA

Indication : Ulcerative colitis.

Prep/Route/Dose : 20mg Prednisolone in 100ml aqueous solution.
Dose: 1 enema at bed time for 2-4 weeks; then
reduced.

SE./S.P./C.I. : As under Hydrocortisone

1.7.5 SULPHASALAZINE (SALAZOPYRIN)

Indication : Ulcerative colitis.

S.E./S.P./C.I. : As under 6.3.2.2

1.7.6 VASOPRESSIN

Indication : Bleeding from oesophageal varices. Pituitary
diabetes insipidus.

- Prep/Route/Dose :** Inj: 20 units/ml-1ml amp.
 Diabetes insipidus 5-20 units S.C. or IM Q.4.h.
 Bleeding oesophageal varices:
 Method of administration — please see literature.
- S.E. :** Pallor, nausea, belching, cramps, desire to defaecate;
 hypersensitivity reaction; constriction of coronary
 arteries (angina; myocardial ischaemia).
- S.P. :** Heart failure, asthma, epilepsy, migraine.
 Adjust fluid intake to avoid hyponatraemia and water
 intoxication.
- C.I. :** Vascular disease, chronic nephritis (until reasonable
 blood nitrogen concentration attained)
 Subcutaneous infiltration can cause ischaemia and
 gangrene of the digits.

Brand/Cost

PITRESSIN : Amp. 20 units: Rs. 477.90 for 10 amp. .
 (Parke Davis)

1.7.7 SCLEROTHERAPY DRUGS

1.7.7.1 SODIUM TETRADECYL SULPHATE (STD)

Indication : Oesophageal varices.

Prep/Route/Dose : as per specific instructions.

1.7.7.2 SODIUM MORRHUATE

Indication : Oesophageal varices.

Prep/Route/Dose : as per specific instructions.

2. DRUGS USED IN ANAESTHESIA

General Anaesthetics:

The present trend in anaesthesia is to administer several drugs with different actions to produce a state of surgical anaesthesia with minimal risk of toxic effects. An intravenous agent is frequently used for induction, followed by maintenance with inhaled anaesthetics, perhaps supplemented by other drugs administered intravenously. Specific drugs are often used to produce muscle relaxation.

Intravenous anaesthetics may also be used alone to produce anaesthesia for short surgical procedures but are more commonly used for induction only. These are potent drugs which nearly all produce their effect in one arm-brain circulation time and can cause apnoea and hypotension and so adequate facilities for resuscitation must be available. Large doses should be avoided in obstetrics, as the drug may cross placental barrier. The drugs are contraindicated if the airway cannot be maintained due to obstructive lesions of larynx and pharynx. Extreme care is required in surgeries of mouth, pharynx and larynx and in patients with congestive cardiac failure and fixed cardiac output. For tracheal intubation, induction should be followed by inhalational anaesthesia or by a neuro muscular blocking drug. Thiopentone is the most widely used intravenous anaesthetic, but has no analgesic property. Induction is smooth and rapid. Ketamine can be given intravenously or intramuscularly and has good analgesic properties when used in subanaesthetic dosage. It is widely used as an inducing agent and for maintenance of anaesthesia in children during short procedures like cardiac catheterization and bronchoscopy. The main disadvantage is the high incidence of hallucinations and transient psychotic sequelae. It is contra-indicated in hypertension and in mental illness.

Inhalational anaesthetics may be gases e.g., Cyclopropane and nitrous oxide. or volatile liquids e.g., Halothane, ether, and enflurane. They can be used for both induction and maintenance of anaesthesia and may be used following induction with an intravenous agent. Gaseous agents require suitable equipment for storage and administration. It is necessary

to monitor flow rate. Volatile agents are usually administered with air, oxygen or nitrous oxide — oxygen mixtures as the carrier gas using calibrated vaporisers. A mixture of nitrous oxide and oxygen is used for induction and maintenance of anaesthesia. Halothane is the most widely used of the volatile agents. Muscle relaxation produced by halothane is inadequate for major abdominal surgeries and specific muscle relaxants should be used. It is hepatotoxic. Cyclopropane forms explosive mixtures with air and oxygen and hence it should be used in a closed circuit system. Adrenaline infiltration should be avoided because of danger of dysrhythmias. Diethyl ether is a potent anaesthetic agent, but is less popular now because the vapour forms flammable and explosive mixtures with oxygen. However it is still used in small set ups because administration is simple and has a wide margin of safety.

2. ANAESTHETICS

2.1 GENERAL ANAESTHETICS AND OXYGEN

2.1.1 ETHER

Indication	: General anaesthetic
Route/Dosage	: Inhalation. Bottle 500ml Induction — 10–15% Maintenance — 3–5%
S.E.	: Irritant, stormy induction and recovery.
Caution	: Inflammable.
C.I.	: Diabetes Mellitus; renal and hepatic dysfunction.

2.1.2 HALOTHANE H

Indication	: Induction and maintenance of anaesthesia in major surgery, with oxygen and nitrous oxide-oxygen mixtures.
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Route/Dosage : Inhalation
 Induction up to 5%
 Maintenance 0.5 to 1%

S.E. : Hepatotoxicity.
 Cardiorespiratory depression

C.I. : Hepatic dysfunction

Brand/Cost

FLUOTHANE : 50ml: Rs. 65.00
 (IEL) 250ml: Rs. 299.00

2.1.3 NITROUS OXIDE

Indication : Induction and maintenance of anaesthesia; analgesia in subanaesthetic doses.

Route/Dosage : Inhalation
 Using a suitable anaesthetic apparatus a mixture with 20–30% oxygen for induction and maintenance of light anaesthesia.
 Analgesic — as a mixture with 50% oxygen.

S.E. : Prolonged exposure may cause megaloblastic anaemia and depression of white cell formation.

2.1.4 OXYGEN

Indication : Along with anaesthetic agents.
 See Respiratory System.

2.1.5 KETAMINE

Indication : Induction and maintenance of anaesthesia.

Route/Dosage : Inj : 10mg/ml & 50mg/ml in 10ml vials.
 Dose: 2mg/Kg I.V.; 10mg/Kg I.M.

S.E. : Tachycardia
Transient psychotic sequelae.

C.I. : Severe hypertension;
cardiovascular accidents;
increased intracranial tension;
increased intra-ocular tension.

Brand/Cost

KETMIN : 2ml amps: Rs. 12.50
(Themis) 10ml Vial Rs. 51.50

2.1.6 THIOPENTAL

Indication : Induction of general anaesthesia;
anaesthesia of short duration.

Route/Dosage : Powder for injection 0.5g sodium salt in ampoule
Dose: 100–500mg I.V.

S.E. : Sedation

C.I. : Respiratory obstruction; status asthmaticus; severe
shock; porphyria; Addison's disease; uncompensated
heart failure.

Brand/Cost

PENTOTHAL : 0.5g vial; Rs. 9.01
(abbot) 1.0g vial; 15.68

INTRAVAL : 0.5g — 50 amps: Rs. 450.50
(M & B) 1.0g — 50 amps: Rs. 554.00

2.1.7 DIAZEPAM

Indication : Sedative for surgical procedures.

S.E. : Drowsiness, dizziness, ataxia, confusion, respiratory
depression, hypersensitivity reaction, pain,
thrombophlebitis with IV infusion.

S.P./C.I. : Respiratory depression; hypersensitivity reaction.

Brands/Cost : See 11.1.2

2.2 LOCAL ANAESTHETICS

Local anaesthetic drugs act by causing a reversible block to conduction along nerve fibres. In estimating the safe dosage of these drugs, it is important to take into account — the rate at which they are absorbed and excreted, their potency, the patient's age, weight, physique, clinical condition, the degree of vascularity of the area to which the drug is to be applied and the duration of administration. Toxic effects are due to high plasma concentration, and these include excitation of the central nervous system followed by depression. Hypersensitivity reactions are more common with cocaine, benzocaine, procaine and amethocaine. Local anaesthetics should not be applied or injected into inflamed or infected tissues because of the risk of rapid absorption and systemic toxicity. Adrenaline, a vasoconstrictor, is added to local anaesthetics to prolong their effect in a concentration of 1/200,000. It should not be used in digits and appendages because of the risk of gangrene, or in patients on tricyclic anti-depressants because of the potentiation of cardiotoxicity.

Lignocaine is the most widely used local anaesthetic. Duration of block with adrenaline lasts for about one and half hours. Adrenaline should not be used with cocaine since it has a vasoconstrictive effect. Amethocaine is a topical anaesthetic agent.

Lignocaine and Bupivacaine can be used for spinal and epidural anaesthesia. These give good muscle relaxation and allow use of cautery. However, they are not suitable for surgery above the diaphragm.

2.2.1 BUPIVACAINE

Indication Local infiltration; nerve block; epidural block.

Route/Dosage Inj : 1% amp (2ml) 0.5% vial (10ml)
Dose: adjusted according to the block. Injection up

to 2mg/kg in any 4 hr period. Spinal anaesthesia: 10-20mg adjusted according to site of operation.

S.E./S.P./C.I. : As under LIGNOCAINE
(See below 2.2.2)

Brand/Cost

MARCAIN : 2ml amp: Rs. 2.00
(Sarabhai)

2.2.2 LIGNOCAINE H DI

Indication : Infiltration; nerve blocks; epidural and caudal block.

Route/Dosage : Inj: 1%, 2% in vial of 30ml
2% with adrenaline: vial of 30ml
5% for spinal anaesthesia: 2ml amp.

Topical forms: Jelly — 2%

Ointment — 5%

Viscous — 2%

S.E. : Hypotension; bradycardia; cardiac arrest; agitation; euphoria; convulsion; respiratory depression..

S.P. : Epilepsy; hepatic dysfunction; bradycardia; elderly

C.I. : Myasthenia gravis; complete heart block; hypovolemia.

Brand/Cost

XYLOCAINE : Inj : 1% 30ml vial: Rs. 3.50
2% 30ml vial: Rs. 3.75
2% with adrenaline:
30ml vial: Rs. 3.80
5% 2ml amp: Rs. 31.36
Jelly : 2% 30g: Rs. 4.50
Viscous : 2% 100ml: Rs. 6.40
Ointment: 5% 10g: Rs. 3.25
35g: Rs. 6.75

3. ANALGESICS

These are used for pain relief. The main groups represented here are the non-opioid analgesics and opioid analgesics.

Analgesic requirement is profoundly influenced by attitude of both the patient and the prescriber to pain.

NON-OPIOID ANALGESICS: These analgesics are mainly intended for relief of mild to moderate pain especially for musculo skeletal conditions — e.g., Aspirin, Paracetamol, Brufen etc.

ASPIRIN is the analgesic of choice for headache treatment of musculoskeletal joint pain, dysmenorrhoea. It has in addition anti inflammatory and antipyretic action. Aspirin in various forms is adequate for most purposes because of their speedy action and low cost. Aspirin in small doses is also used as an antiplatelet drug in myocardial infarction. Major problem is gastric irritation that can be minimised by taking it with food. The buffered aspirin and other formulations are mainly to improve gastric tolerance. Contraindicated in children below 12 years and in breast feeding (for fear of Reye's syndrome), gastrointestinal ulceration, haemophilia and with concurrent anticoagulant therapy.

PARACETAMOL is equiefficient as aspirin but has no anti inflammatory action. The gastric irritant effects are also less. Paracetamol overdose has the danger of causing hepatic necrosis which may not be evident for 4 — 6 days. It is indicated for mild to moderate pain and in pyrexia. It should be used with caution in hepatic impairment, alcoholism.

Drug interactions with metoclopramide result in potentiation of effect.

Naproxen, Ibuprofen etc. These are used for mild to moderate pain, pyrexia and are best given after food.

PIROXICAM is well absorbed orally with a long half life of 38–45 hours and hence can be administered once a day. Doses of 10–20mg. are analgesic antipyretic where as higher doses are needed for anti

inflammatory effect. It also has gastric irritant effects and is used in rheumatoid and osteo arthritis.

The non-opioid analgesics are also called non steroidal anti inflammatory drugs. In single doses they are comparable to paracetamol as analgesic and full doses have analgesic and anti-inflammatory effect. Their use is hence in rheumatoid and osteoarthritis. In general these should be used with caution in the elderly, in peptic ulceration, pregnancy, renal and liver damage. Drug interactions with anticoagulants occur.

1. NSAIDs should not be given to patients with active peptic ulceration.
2. In patients with a history of peptic ulcer disease and in the elderly they should be given only after other forms of treatment have been carefully considered.
3. In all patients it is prudent to start at the bottom end of the dose range.

Any degree of worsening of asthma may be related to the ingestion of NSAIDs, either prescribed or (in the case of ibuprofen) purchased over the counter.

SIDE EFFECTS: Side effects are variable in severity and frequency, Gastrointestinal discomfort, nausea, diarrhoea and occasionally bleeding occur and may be minimised by advising that these drugs should always be taken with food or milk. Hypersensitivity reactions (particularly angioedema, asthma, and rashes), headache, dizziness, vertigo and hearing disturbances such as tinnitus. Blood disorders have occurred. Fluid retention may occur (rarely precipitating congestive heart failure in elderly patients). Rarely, reversible acute renal failure may be provoked by NSAIDs especially, in patients with pre existing renal impairment; papillary necrosis or interstitial fibrosis, associated with NSAIDs may also lead to chronic renal failure.

CHOICE OF DRUG: Differences in anti-inflammatory activity between different NSAIDs are small, but there is considerable variation in

individual patient response. About 60% of patients will respond to any NSAID. Among the rest, those who do not respond to one may well respond to another. Therefore it is often necessary to try several drugs before finding one to suit a particular patient. Most NSAIDs should produce an effect within a few days. If used for analgesia alone they should be changed if no response is obtained after a week; if an anti-inflammatory action is also required they should be changed if no response is obtained after three weeks.

The main differences between NSAIDs are in the incidence and type of side effects. Before treatment is started the prescriber should weigh efficacy against possible side effects for each drug.

3. ANALGESICS, ANTIPYRETICS and NON-STEROIDAL ANTIINFLAMMATORY DRUGS

3.1 NON-OPIOIDS

3.1.1 ACETYLSALICYLIC ACID D I P

Indication	: Mild to moderate pain; pyrexia.
Route/Dosage	: Tablet — 300mg Dose: 300–900mg. Q 4–6 hours Max: 4G/day
S.E.	: Gastro-intestinal irritation; bronchospasm and skin reactions in hypersensitive patients.
C.I.	: Children under 12 years; Ryes Syndrome. Peptic ulcer disease; haemophilia; concurrent anti-coagulant therapy.
S.P.	: Bronchial asthma; pregnancy; renal and hepatic dysfunction.

Brand/Cost

ASPIRIN : 300mg tab: Rs. 7.00 for 100
(Haffkine) Rs. 56.25 for 1000

ASABUF : 350mg tab: Rs. 2.70 for 10
(Wallace)

DISPRIN : 350mg tab: Rs. 2.19 for 12
(RCI)

3.1.2 IBUPROFEN D I P

Indication : Mild to moderate pain

Prep/Route/Dose : Tablet : 200mg; 400mg; 600mg;
Suspension: 100mg/5ml
Dose : 400mg TID after food initially
200mg TID after food maintenance
Paediatric: 20mg/kg/day in 3 divided doses.

S.E. : Gastro-intestinal discomfort; hypersensitivity reactions; headache; dizziness; vertigo; pruritis; fluid retention.

C.I. : Active peptic ulcer disease. Hypersensitivity.

S.P. : Pregnancy

Brand/Cost

IBUPROFEN : Tab: 200mg: Rs. 215.00 for 1000
(CMS-I) 400mg: Rs. 365.00 for 1000

BRUFEN : Tab: 200mg: Rs. 5.09 for 10
(Boots) 400mg: Rs. 9.41 for 10
600mg: Rs. 11.11 for 10

NUGIN : Tab: 200mg: Rs. 4.89 for 10
(Glaxo) 400mg: Rs. 9.04 for 10

3.1.3 INDOMETHACIN

- Indication : Pain with moderate to severe inflammation in rheumatic disease and other musculoskeletal disorders; acute gout.
- Preparation : Caps: 25mg
- Dose : 25mg–50mg TID
- S.E. : Headache, dizziness, ulceration and gastro-intestinal bleeding; drowsiness, confusion, depression, syncope; thrombocytopenia, hypertension; hyperglycaemia; blurred vision; corneal deposits; peripheral neuropathy.
- S.P. : Lactation; epilepsy; psychiatric disturbances; hypertension; renal diseases.

Brand/Cost

- IDICIN : Caps: 25mg: Rs. 23.16 for 10x10 caps.
(IDPL)

3.1.4 PARACETAMOL

- Indication : Mild to moderate pain; pyrexia
- Route/Dosage : Tab : 500mg,
Inj : 300mg/2ml amp.
Syrup 120mg/5ml.
Dose: Adult: 1–2 tab 3–4 times daily
Children: 1–3 years: ½ tsp per dose
3–7 years: 1–2 tsp per dose
7–12 years: 2 tsp per dose
- S.E. : Liver damage on prolonged use or over dosage.
- S.P. : Hepatic dysfunction.
- C.I. : Hypersensitivity to paracetamol.

Brand/Cost

PARACETAMOL : Tab: 500mg: Rs. 95.00 for 1000
(CMS-I)

CALPOL : Tab : 500mg: Rs. 2.05 for 10
(B.W.) Suspension: 120mg/5ml: Rs. 4.68 for 60ml

CROCIN : Tab : 500mg: Rs. 2.05 for 10
(Duphar) Syrup: 125mg/5ml: Rs. 5.14 for 60ml

3.1.6 KETOPROFEN

Indication : Pain and mild inflammation in rheumatic disease
other musculoskeletal disorders; dysmenorrhoea.

Route/Dosage : Caps: 50mg & 100mg
Dose: 50–100mg BD

S.E./C.I. : As for Ibuprofen

Brand/Cost

ORUDIS : Caps: 50mg: Rs. 8.65 for 10
(PCI)

OSTOFEN : Caps: 50mg: Rs. 9.00 for 10
(Torrent)

3.1.7 NAPROXEN

Indication : Pain and inflammation in rheumatic disease and
other musculoskeletal disorders; acute gout.

Route/Dose : Tab : 250mg
Dose: 250mg BD

S.E./C.I. : As for Ibuprofen

Brand/Cost

NAPROSYN : Tab: 250mg: Rs. 22.82 for 10
(Searle)

NAXID : Tab: 250mg: Rs. 18.22 for 10
(Cipla)

3.1.8 PIROXICAM

Indication : Pain and inflammation in rheumatic disease and other musculoskeletal disorders; acute gout.

Route/Dose : Caps: 10mg & 20mg
Dose: Initially 20mg O.D. after food
Maintenance: 10mg-20mg O.D.

S.E./C.I. : As for Ibuprofen

Brand/Cost

PIROX : Caps: 10mg: Rs. 11.30 for 10
(Cipla) 20mg: Rs. 16.90 for 10

BREXIC : Caps: 10mg: Rs. 4.50 for 6
(Wockhardt) 20mg: Rs. 7.20 for 6

3.2 OPIOID ANALGESICS

They are used for relief of moderate to severe pain. These are narcotic analgesics of varying degree of dependence and tolerance especially when used repeatedly. However this is no deterrent to its use in the control of pain in terminal illness.

These drugs should be used with caution in patients with a history of drug abuse, decreased respiratory reserve, hypothyroidism, asthma, hepatic and renal impairment and during pregnancy and lactation. Their use should be avoided in patients with raised intracranial tension or head injury as they will interfere with respiration, pupillary responses etc. which are vital for clinical assessment. Dose should be modified in presence of renal damage. Dosage should be reduced also in the elderly and debilitated patients.

SIDE EFFECTS: In common, all of them cause constipation, respiratory depression, cough suppression, urinary retention, nausea and tolerance and dependance of the narcotic analgesics.

Of this group, morphine remains the most valuable opioid analgesic for severe pain. Buprenorphine is suitable for sublingual or parenteral use. It has both opioid agonist and antagonist properties and may precipitate withdrawal symptoms. It has a longer duration of action than morphine (8-12 hours). Dependence potential is low and opioid effects are only partially reversed by naloxone but doxaprim is an effective antidote. Pentazocine is weaker than morphine and has agonist and antagonist properties. It should be used with caution in patients already on opioid analgesics as it can precipitate withdrawal symptoms.

Codeine though an opioid analgesic has predominant cough suppressant effect and it is used for this purpose mainly and for the constipating action.

3.2.1 CODEINE

Indication	: Mild to moderate pain.
Route/Dose	: Tab : 30mg (Phosphate) Dose: 10-60mg every 6 hours up to max. 200mg/day
S.E.	: Tolerance and dependence; sedation; dizziness; nausea; constipation.
S.P.	: As for OPIOID analgesics. Avoid in children below 1 year.

Brand/Cost

CODEINE

PHOSPHATE : Tab: 30mg: Rs. 126.00 for 1000
(Belco Pharma)

3.2.2 MORPHINE

Indication : Severe pain; acute pulmonary oedema

Route/Dose : Inj : 15mg/ml ampoule
Dose: IM or S.C. 8–15 mg (adult)
Child: 0.1mg/kg
Adult: I.V. 2mg/min up to 10mg–15mg

S.E./C.I. : As for OPIOID analgesics

Brand/Cost*

*Please follow the State Government regulations.

3.2.3 PETHIDINE

Indication : Moderate to severe pain; obstetric analgesia.

Route/Dose : Inj : 50mg/ml — 2ml ampoule
Dose: Adult: IM — 25–100mg
IV — 25–50mg
Child: 1mg/kg

S.E./C.I. : As for OPIOID analgesics

Brand/Cost*

*Please follow the State Government regulations.

3.2.4 PENTAZOCINE

Indication : Moderate to severe pain

Route/Dose : Tab : 25mg
Inj : 30mg per ml
Dose: IM 30–60mg, (may be repeated Q.6.h.)
IV 30mg
Oral : 1–4 Tablets

S.E./C.I. : As for OPIOID analgesics

Brand/Cost

FORTWIN : Tab: 25mg: Rs. 12.55 for 10
(Ranbaxy) Inj : 30mg per ml: Rs. 39.89 for 10amps.

3.2.5 BUPRENORPHINE

Indication : Moderate to severe pain

Route/Dose : Tab: 0.2mg sublingual. Q.6-8.h
Inj : 0.3mg — 0.6mg IM or IV
(May be repeated Q.6.h)

S.E./C.I. : As for OPIOID analgesics.

Brand/Cost

TAMGESIC : Tab: Rs. 13.00 for 10
(Dadha Pharma)

4. ANTI-ALLERGICS

Antihistaminics: All antihistaminics are of potential value in the management of nasal allergies such as vasomotor rhinitis, and hay fever. Their usefulness is in relieving nasal congestion, reducing rhinnorrhoea and sneezing.

Oral antihistaminics are of some value in preventing urticaria and are used to treat allergic rashes, pruritus and insect bites and stings and in drug allergies. Chlorpheniramine and promethazine injections are used as adjuncts to adrenaline injection in emergency treatment of angioedema and anaphylaxis. They are also useful in travel sickness.

There is no evidence that any one antihistamine is superior to another and patients vary widely in their response to them. The differences are only in terms of duration of action and incidence of side effects. Most antihistaminics are short acting except promethazine which is active for upto 12 hours. All produce sedation of varying extent. Astemizole is reported to be least sedative and produce minimal psychomotor disturbance due to poor penetration of blood brain barrier.

They interact with other drugs; alcohol, barbiturates and benzodiazepines potentiate their effect. Serious disadvantage is that they may cause drowsiness that can interfere with driving or operating machinery.

Anticholinergic effects like urinary retention, dry mouth, blurred vision, paradoxical stimulation, etc., can occur. They should be used with caution in epilepsy, prostatic hypertrophy, glaucoma or hepatic disease.

4.1 ANTIHISTAMINES/DECONGESTANTS

4.1.1 CHLORPHENIRAMINE MALEATE DI

Indication : Cough

Route/Dose : Tab: 4mg

Adult: 4mg, 3-4 times/day

Child: 0.35mg/kg/24 hrs in 4 doses.

S.E. : Drowsiness; headache; urinary retention; blurred vision; gastro-intestinal disturbance.

S.P. : Epilepsy; prostatic hypertrophy; glaucoma; hepatic disease.

Brand/Cost

PIRITON : Rs. 10.63 for 500
(Glaxo)

4.1.2 CYPROHEPTADINE HCl DI

Indication : Allergy; pruritis.

Route/Dose : Tab: 4mg; Syrup: 2mg/5ml.
Adult: 1 tab BD or TID.
Child: 0.2 mg/kg/day in 2-3 divided doses.

S.E./C.I. : As for Antihistamines.

Brand/Cost

PRACTIN : Tab : Rs. 3.08 for 10
(Merind) Elixir: 2mg per 5ml; Rs. 11.30 per 100ml.

4.1.3 DIPHENHYDRAMINE DI

Indication : Allergic conditions

Route/Dose : Caps : 25mg; Kapseal: 50mg
Syrup: 12.5mg/5ml
Dose : 1 cap or Kap 3-4 times/day
Syrup 10-25ml 3-4 times/day (Adult)
5-10ml 3-4 times/day (Children)

S.E./C.I. : As for Antihistamines.

Brand/Cost

BENADRYL : Caps : 25mg: Rs. 2.41 per 25
(Parke Davis & Co) Syrup: Rs. 6.08 for 114ml

4.1.4 PROMETHAZINE DI

Indication : Allergy, nausea.

Route/Dose : Tab : 10mg & 25mg
Inj : 25mg/ml — 2ml amp.
Syrup: 5mg/5ml
Dose : 25mg at night
Inj: 25mg deep IM
Syrup: children: 0.5mg/kg/dose

S.E./C.I. : As for Antihistamines

Brand/Cost

PHENERGAN : Elixir: 5mg per 5ml: Rs. 6.92 per 120ml
Inj : 2.5% 2ml amp: Rs. 11.70 for 10 amps.
Tab : 10mg: Rs. 0.89 for 10
25mg: Rs. 1.14 for 10

4.1.5 PHENIRAMINE MALEATE DI

Indication : Allergy; allergic dermatitis; insect bite.

Route/Dose : Tab : 25mg
Inj : 22.5mg/ml 2ml
Dose: Adult: 1 tab BD or TID
Inj: 1-2ml BD IM or slow IV

S.E./C.I. : As for antihistamines

Brand/Cost

AVIL : Inj : 22.5mg per 2ml: Rs. 11.01 per 10ml vial
(Hoechst) Syrup: 15mg per 5ml: Rs. 4.12 per 100ml

4.1.6 TRIPROLIDINE HCl

Indication : Allergy

Route/Dose : Tab : Triprolidine HCl 2.5mg
Pseudoephedrine 60mg

Dose : Adult: 1 tab BD or TID
 Child 2-12 years: ½ tab BD or TID
 Syrup: Triprolidine HCl 2.5mg/5ml
 Ephedrine HCl — 15mg/5ml
 Dose : Child 2-5 years: 1.25ml BD
 2-10 years: 2.5ml BD
 above 10 years: 2.5ml TID.

S.E./C.I. : As for antihistamines

Brand/Cost

ACTIFED : Tab: Rs. 3.11 for 10
 (B.W.)

ACTIDIL : Elixir: 2mg per 5ml
 (B.W.) 30ml Rs. 2.04

4.1.7 MEBHYDROLIN NAPADISYLATE

Indication : Allergic conditions

Route/Dose : Tab : 50mg base :
 Dose: Adult: 2-5 tab daily in 3-4 divided doses.
 Child: 5-10 years: 2-4 tabs in 3-4 divided doses
 2-5 years: 1-3 tab in 3-4 divided doses.

S.E./C.I. : As for antihistamines.

Brand/Cost

INCIDAL : Tab: Rs. 16.19 for 100
 (Bayer)

4.1.8 ASTEMIZOLE

Indication : Allergic rhinitis; allergic conjunctivitis.

Prep/Route/Dose : Tab : 10mg
 Suspension: 1mg/ml

S.P./C.I. : Pregnancy

Brand/Cost

ASTELONG : Rs. 12.00 for 10 tabs
(Torrent) Rs. 9.90 for 60ml

4.2 CORTICOSTEROIDS

4.2.1 BETAMETHASONE DI

Indication : Severe asthma; hay fever; allergic skin disorders.

Route/Dose : Tab: 0.5mg
Inj : 4mg/ml — 2ml amp.

S.E./C.I. : As for CORTICOSTEROIDS

Brand/Cost

BETNELAN : Tab: Rs. 2.06 for 10
(Glaxo)

BETNESOL : Inj: Rs. 14.67 for 3 amps.
(Glaxo)

CELESTONE : Tab: Rs. 3.88 per 10
(Fulford)

4.2.2 DEXAMETHASONE DI

Indication : Allergic conditions

Route/Dose : Tab: 0.5mg
Inj : 4mg/ml, 2ml vials

S.E./C.I. : As for CORTICOSTEROIDS (See

Brand/Cost

WYMESONE : Tab: Rs. 2.47 for 10
(Wyeth) Inj : 2ml vial Rs. 6.62

DECADRON : Tab: Rs. 2.22 for 10
(Merind) Inj : 2ml vial Rs. 9.12

4.2.3 HYDROCORTISONE SODIUM SUCCINATE DI

Indication : Allergic and anaphylactic conditions.

Route/Dose : Inj: 100mg/2ml; IM or slow IV.
Adult: 100-500mg 3-4 times/day or as required
Child: upto 1 year: 25mg 1-5 years: 50mg
6-12 years: 100mg

S.E./C.I. : As for CORTICOSTEROIDS (See)

Brand/Cost

EFCORLIN
SOLUBLE : Inj: 13.45 per vial
(Glaxo)

LYCORTIN : Inj: 100mg vial: Rs. 11.11
(Lyka)

4.2.4 PREDNISOLONE DI

Indication : Allergic conditions

Preparation : Tab: 5mg; 10mg.

S.E./C.I. : As for CORTICOSTEROIDS

Brand/Cost

WYSOLONE : Tab: 5mg: Rs. 3.09 for 10
(Wyeth) 10mg: Rs. 5.95 for 10

DELTA CORTIL : Tab: 5mg: Rs. 27-00 for 10x10
(Pfizer) 10mg: Rs. 21-62 for 5x10

4.3 OTHER DRUGS USED IN ALLERGIC STATES

4.3.1 ADRENALINE (EPINEPHRINE)

- Route/Dose : Inj: (1:1000): 1ml amp.
Adult: 0.2–0.5ml S.C or IM
Child: 0.01ml/kg
- S.E. : Palpitation; sweating; tremor; hypertension
- C.I. : Hypertension; myocardial disease; cardiac asthma;
hyperthyroidism.
- S.P. : Dangerous in status asthmaticus.
Avoid in infants and the very old.

Brand/Cost

ADRENALINE : Inj: 1 in 1000: Rs. 60.44 per 50 amps.
(Bengal Chem &
Pharma)

5. POISONING

The mainstay of successful treatment in poisoning is proper identification of the agent ingested, the dose taken, and a knowledge of the drug's pharmacology and toxic effects. Supportive therapy, however, should not be delayed while awaiting identification.

First aid measures in poisoning include prevention of drug absorption and enhancement of elimination. Gastric lavage and forced emesis with syrup of ipecacuanha effectively remove the poison from the stomach. However, these measures are of doubtful value if attempted more than 4 hours after ingestion except in cases of agents which delay gastric emptying (eg., salicylates and anti-depressants). Gastric lavage and forced emesis is contraindicated in poisoning with corrosives and petroleum distillates. Comatose patients should have a cuffed endotracheal tube insitu prior to lavage, to prevent aspiration of gastric contents. Activated charcoal effectively adsorbs most drugs and hence reduces their absorption if given within 1-2 hours after ingestion of the poison. It should not be given along with an antidote since it will bind the antidote. In case of organophosphorus poisoning (e.g. insecticide sprays), all clothes should be removed and the skin thoroughly washed.

Repeated doses of activated charcoal also enhance elimination of certain drugs such as aspirin, carbamazepine, digoxin, barbiturates, phenytoin, quinine and theophylline. Other techniques of poison elimination are forced alkaline diuresis (salicylates and phenobarbitone), hemodialysis (salicylates, phenobarbitone, methyl alcohol, ethylene glycol and lithium), and charcoal hemoperfusion (medium and short acting barbiturates, chloral hydrate and meprobamate).

Intensive supportive care should be instituted along with the above. A clear airway should be established and maintained. Intubation should be performed in any patient with respiratory insufficiency, loss of consciousness, impaired or absent gag reflex or status epilepticus. Supplemental oxygen and assisted ventilation should be provided as indicated clinically or with the help of arterial blood gases. Pulmonary edema due to toxic endothelial damage or volume overload should be treated.

Hypotension usually responds to volume expansion with normal saline and correction of hypoxia and acidosis. Dopamine is the vasopressor of choice in refractory hypotension but should be used carefully in overdoses with tricyclic anti-depressant or phenothiazine overdose. Hypertension is uncommon but can occur with sympathomimetic overdoses in which case propranolol, sodium nitroprusside and sodium diazoxide are useful agents.

CNS depression is a common feature of overdose with sedative-hypnotics and narcotics. Naloxone is used as a diagnostic agent or to reverse depressant effects of narcotics. Administration of 50% dextrose and thiamine is mandatory in any patient with depressed level of consciousness. Hemoperfusion or hemodialysis is generally indicated in managing comatose patients with circulatory or respiratory failure. Repetitive seizures require treatment with diazepam.

Certain drugs (e.g. salicylates, methanol, ethylene glycol) may cause a metabolic acidosis which, if significant (pH less than 7.2), should be corrected with I.V. sodium bicarbonate.

Antidotes are indicated for specific poisoning as a diagnostic manoeuvre and to reverse or protect against life threatening drug effects.

ANTIDOTES AND OTHER SUBSTANCES USED IN POISONING

5.1 GENERAL

5.1.1 CHARCOAL, Activated

Indication : Binding of poisons, reducing absorption.

Route/Dose : Powder: 25g every 2 hours
50g every 4 hours.

5.1.2 IPECACUANHA

Indication : Induction of vomiting.

Route/Dose : Syrup: 14mg/10ml
Adult: 30ml; may be repeated after
20 minutes.
Child: 6-18 months: 10ml
Older children: 15ml

5.1.3 MAGNESIUM SULPHATE

Route/Dose : Powder 10-30g
Adult: 5-10g with 100-200ml water
Child: 100-250mg/kg
Mixture: 4g/10ml
Adult: 10-20ml with water
Child: 5-10ml

S.P. : Hepatic and renal impairment.

5.2 SPECIFIC

5.2.1 ATROPINE SULPHATE

Indication : Organophosphorus poisoning

Route/Dose : Inj : 0.6mg/ml
Dose: 0.3-2mg S.C., IM
Massive doses IV in organophosphorus poisoning.

S.C. : Dry mouth, dilatation of pupil; increased intraocular pressure; difficulty with micturition; constipation; arrhythmias.

C.I. : Glaucoma

S.P. : Elderly; urinary retention; prostatic enlargement; tachycardia; paralytic ileus; ulcerative colitis; pyloric stenosis.

(Bengal Chem & Pharma)
: Inj: Rs. 38.19 for 50 amps.

5.2.2 DESFERRIOXAMINE

Indication : Removal of iron from the body in poisoning.

Route/Dose : Inj: 500mg in vial
Dosage & adm.: see literature

S.E./C.I. : See literature

Brand/Cost

DESFERAL : Inj: Rs. 157.85 for 5 amps.
(Hindustan CIBA
GEIGY)

5.2.3 DIMERCAPROL

Indication : Poisoning by antimony, arsenic, bismuth, gold, mercury, thallium, adjunct in lead poisoning.

Prep/Route/Dose : Inj. in oil: 50mg/ml, 2ml amp, deep IM.
Adult: 100mg every 4 hours for 48 hours, then 100mg TID for 8–10 days.
In Wilson's disease: 300mg daily for 10 days every 2nd month for long periods.
Child: 4mg/kg every 4 hours initially, later 2.5 mg/kg.

S.E. : Nausea; vomiting; headache; burning in eyes, mouth; lacrimation; muscle pain; angina; drug fever.

S.P. : Hepatic damage; hypertension

C.I. : Iron & cadmium poisoning.

Brand/Cost

BAL : Inj: amp. Rs. 14.65
(Boots)

5.2.4 NALORPHINE (Currently not available)

Indication : Overdosage with opioids

5.2.5 NEOSTIGMINE

- Indication : Reversal of neuromuscular effect of snake-bite.
Reversal of non-depolarising block; reversal of residual paralysis produced by muscle relaxants.
- Prep/Route/Dose : Tab: 15mg
Inj : 0.5mg/ml
Adult: 12-30mg every 4-6 hours orally; 0.25-1mg IM
Child: Orally 0.25mg/kg/dose IM 0.025-0.045mg/kg/dose
In snake bite, 50-100 micrograms/kg (usually 2-3mg) every 4 hours (one ampoule of atropine to be given simultaneously).
- S.E. : Salivation; bronchospasm; diarrhoea; intestinal colic; miosis; tachycardia; cholinergic crisis.

Brand/Cost

PROSTIGMIN : Inj: Rs. 22.18 for 50 amps.
(Roche)

5.2.6 PRALIDOXIME H

- Indication : Adjunct to atropine in the treatment of organophosphorus poisoning.
- Prep/Route/Dose : Inj : 0.5g powder in vial
Adult: 1g IV at a rate not exceeding 500mg/min. or dilute in 250ml of saline and infuse over 30 minutes.
Child: 25-40mg/kg as a 5% solution; up to 60mg/kg in severe cases.
- S.E. : Drowsiness; giddiness; tachycardia; blurred vision; hypotension; neuromuscular blockage with higher doses.
- C.I. : Hepatic failure

Brand/Cost

P₂AM : Inj: Rs. 99.50 for 2 amps.
(Unichem)

5.2.7 PENICILLAMINE R H

Indication : Copper or lead poisoning; Wilson's disease;
rheumatoid arthritis.

Prep/Route/Dose : Cap: 250mg of base
0.9 — 1.8G daily in 4 doses (Max 4G/day)
Infants over 6 months: 20mg/kg/day.
Older children: 1G/day in 4 doses.

S.E. : Headache; fever, rash; loss of taste;
lymphadenopathy; agranulocytosis;
thrombocytopenia; nephrotic syndrome; proteinuria;
allergic reactions similar to penicillin.

S.P. : During treatment regular blood counts and urine
examination required.

C.I. : Renal and hepatic failure. S.L.F.

Brand/Cost

DISTAMINE
(Dista)

6. ANTI-INFECTIVE DRUGS

The commonest parasitic infection in India is *hook worm* which is a major cause for iron deficiency anaemia. Bephenium was widely used as it has least side effects and is effective against *round worms*. Mebendazole is more popular because of the broader spectrum of activity. Thiabendazole also with a wider spectrum of activity especially against strongyloides is used. But this has greater side effects than Mebendazole.

For *thread worm* infection the drugs by themselves are not quite effective. Mebendazole, as a single dose of 100mg, is the drug of choice. Other drugs like Piperazine and Pyrantel are equally effective. The use of Mebendazole is cautioned during pregnancy. Hygienic measures must be adopted to break the cycle of auto-infection.

For *round worm* infection, Levamisole is considered very effective but expensive. Mebendazole, Pyrantel and Piperazine may be given.

For *tape worm* infection drugs are generally effective; repeated treatments are necessary. Niclosamide, Praziquantel and Albendazole are considered effective. Praziquantel is also effective in Schistosomiasis.

6.1 ANTIHELMINTHICS

6.1.1 ALBENDAZOLE P

Indication : Round worms, hook worms, thread worms, whip worms, pin worms and tape worms.

Prep/Route/Dose : Tab : 200mg
Suspension: 200mg/5ml
Adults & children single dose of 400mg.

C.I. : Pregnancy

S.P. : Hepatic or renal dysfunction.

Brand/Cost

ALBENDOL : Tab : Rs. 4.00 for 2
(Micro Lab) Suspension: Rs. 6.60 for 10ml

ZENTEL : Tab : Rs. 5.70 for 2
(Eskayef) Suspension: Rs. 7.80 for 10ml

6.1.2 MEBENDAZOLE P

Indication : Thread worm, round worm, hook worm, whip worm,
pin worm, mixed infections, tape worm.

Prep/Route/Dose : Tab : 100mg
Syrup: 100mg/5ml
1 tab or 5ml, BDx3 days

S.E. : Abdominal pain; diarrhoea.

S.P. : Pregnancy

C.I. : Children below 2 years.

Brand/Cost

MEBENDAZOLE : Tab: 100mg: Rs. 96.00 for 600 tabs.
(CMS-I)

MEBEX : Tab : 100mg: Rs. 4.88 for 6
(Cipla) Granules: Rs. 2.20 for 5g sachets

6.1.3 NICLOSAMIDE P

Indication : Taenia saginata; T. solium; Diphyllbothrium latum;
Hymenolepis nana.

Prep/Route/Dose : Tab: 500mg
Adult: After a light breakfast 2g as a single dose or 2
divided doses one hour apart. To be thoroughly
chewed and swallowed with little water. Followed by
a purgative after 2 hours.

Child above 8 years: $\frac{1}{2}$ adult dose. (Use an antiemetic early morning on day of treatment).

S.E. : Gastro-intestinal discomfort; pruritis; light headedness.

Brand/Cost

NICLOSAN : Tab: Rs. 8.30 for 4
(Biddle Sawyer)

6.1.4 PRAZIQUANTEL P

Indication : Cysticercosis; schistosomes (haematobium, mansoni and japonicum).

Preparation : Tab: 600mg

Brand/Cost

BILTRICIDE : Not currently available.

6.1.5 PYRANTEL P H

Indication : Round worm, thread worm and hook worm.

Prep/Route/Dose : Tab : 250mg
Suspension: 50mg/ml
Dose : 10mg/kg — max. 1g as a single dose.
Hookworm — as above for 3 consecutive days.

S.P. : Liver disease; pregnancy.

Brand/Cost

NUMANTEL : Tab : 250mg: Rs. 5.20 for 2
(Searle) Suspension: 250mg/5ml: Rs. 5.20 for 10ml.

COMBATRIN : Tab : 200mg: Rs. 3.69 for 2
(Pfizer) Suspension: 25mg/ml: Rs. 4.34 for 8ml.

6.2 ANTIAMOEBIIC DRUGS

METRONIDAZOLE is the drug of choice for acute amoebic dysentery as it is effective against the vegetative amoebae at a dosage of 800mg thrice daily for 5 days. It is also effective in amoebic hepatitis and in other extra-intestinal amoebiasis when the treatment course is 400mg thrice daily for 10 days. It has no effect on cyst.

DILOXANIDE FUROATE is the drug of choice for chronic infections in which only cyst forms are present. The usual duration of course is 10 days and is devoid of serious side effects.

TINIDAZOLE is an equally effective amoebicide like metronidazole.

EMETINE though effective produces many marked side effects and is now largely replaced by metronidazole.

CHLOROQUINE is used mainly for hepatic amoebiasis in doses of 600mg daily for 5 days followed by 300mg daily for 14-21 days. It is slower in action and less effective than metronidazole.

6.2.1 DILOXANIDE FUROATE

Indication : Acute, subacute and chronic intestinal amoebiasis.

Prep/Route/Dose : Tab: 500mg

Adult: 500mg TID for 10 days

Child: 20mg/kg/24 hours in 3 doses for 10 days
(Luminal amoebicide of choice)

S.E. : Flatulence; vomiting; urticaria; pruritis.

Brand/Cost

FURAMIDE : Tab: Rs. 5.70 for 10
(Boots)

ENTAMIZOLE-

FORTE : Tab : Rs. 10.10 for 15
(Boots-Diloxa- Syrup: Rs. 16.09 for 75ml

01882

DR 4100

nide 500mg+
Metronidazole
400mg

6.2.2 METRONIDAZOLE P L I

Indication : Amoebic dysentery, intestinal amoebiasis, giardiasis.

Prep/Route/Dose : Tab : 200mg & 400mg
Syrup: 100mg/5ml
Inj : 5mg/ml
Adult: 400-800mg TID for 5-10 days
Child: 35-50mg/kg/24 hrs for 10 days.

S.E. : Gastro-intestinal disturbances (take after food);
drowsiness; headache; peripheral neuropathy.

S.P. : Pregnancy; lactation, alcohol.

Brand/Cost

METRONIDA-
ZOLE
(CMS-I)

: Tab: 200mg: Rs. 170.00 for 1000
400mg: Rs. 282.00 for 1000

FLAGYL
(May & Baker)

: Inj : Rs. 12.80 for 100ml
Flagyl paediatric: 200mg/5ml: Rs. 8.88 per 30ml
Tab: 200mg: Rs. 3.09 for 10
400mg: Rs. 5.26 for 10

METROGYL
(Unique)

: Tab: 200mg: Rs. 2.99 for 10
400mg: Rs. 5.10 for 10

6.2.3 TINIDAZOLE P L DI

Indication : As for metronidazole

Prep/Route/Dose : Tab : 300mg
Dose: 600mg BDx5 days
Child: 50mg/kg, single dose

S.E./S.P. : As for Metronidazole

Brand/Cost

TINI : Tab: 300mg: Rs. 72.75 for 100
(Kopran) 500mg: Rs. 120.00 for 100

TRIDAZOLE : Tab: 300mg: Rs. 7.01 for 10
(Franco Indian)

6.2.4 DEHYDROEMETINE

Indication : Amoebiasis; schistosomiasis.

Prep/Route/Dose : Tab: 100mg
10–20mg tid., for 6–10 days; if required 15 days.
Inj : 30mg/ml
1mg/kg body weight daily for 6–10 days.

C.I. : Severe organic disease; pregnancy

S.P. : Treatment should not be started less than 45 days
after a previous course of emetine.

Brand/Cost

DEHYDROEME-

TINE : Tab: Rs. 6.56 for 10
(Roche) Inj : 30mg: Rs. 3.48 for 1ml
60mg: Rs. 6.01 for 2ml

6.3 ANTIBACTERIALS

Before starting an antibiotic, patient factors such as history of allergy, severity of illness, age, pregnancy, liver and renal function and other concomittantly given drugs should be considered. Equally important is to consider the nature of the organism and its antibiotic sensitivity. It is important to remember that most upper respiratory infections are of viral origin and viral infections should not be treated with antibiotics. The antibiogram of local pathogens is of great help. Dose adjustments would

be required for very young, very old and those with renal impairment or very severe infection.

PROPHYLACTIC use of antibiotics is recommended only in a few situations. They are — prevention of recurrence of rheumatic fever (Penicillin), prevention of secondary cases of meningococcal meningitis (Refampicin), prevention of secondary case of diphtheria in non-immune patient (Erythromycin), prevention of bacterial endocarditis in patients with heart valve lesions, (penicillin), prevention of gas gangrene in high lower limb amputation or following major trauma (Penicillin) prevention of tuberculosis in susceptible close contacts (Isoniazid), prevention of infection in abdominal surgery — gastric, oesophageal carcinoma, cholecystectomy (gentamicin or cephalosporin), resections of colon, rectum (gentamicin and metronidazole) and hysterectomy (metronidazole).

Curative use

1. Gastrointestinal

For bacillary dysentery and gastro-enteritis, antibiotics are generally not indicated. But in severe shigella dysentery nalidixic acid is useful. For enteritis due to *compylobacter*, erythromycin and for giardiasis, metronidazole are useful.

Typhoid fever — chloramphenicol, cotrimoxazole, ampicillin or amoxycillin.

Biliary infections — gentamicin or cephalosporin.

Peritonitis — gentamicin and metronidazole.

Whenever anaerobic infections are suspected, metronidazole should be used.

2. For *pneumonias* depending on the organism, chloramphenicol, ampicillin or cotrimoxazole is to be used.

3. For *meningitis* with meningococci, pneumococci or *H. influenza* — penicillin or chloramphenicol respectively can be given.

4. *S.T.D.* Syphilis and gonorrhoea respond to penicillin and to those patients sensitive to penicillin, erythromycin can be given. Many strains of gonococci are resistant to penicillin but respond to tetracycline.

5. *Urinary tract*

Acute pyelonephritis or prostatitis — cotrimoxazole or trimethoprim or gentamicin or cephalosporin.

Lower U.T.I. — trimethoprim, ampicillin or nitrofurantoin or oral cephalosporins.

6. *E.N.T. infection.*

Tonsillitis — penicillins or erythromycin.

Otitis media — penicillins or amoxycillin or erythromycin.

Sinusitis — erythromycin or cotrimoxazole.

Dermatological

Impetigo - topical chlortetracycline or penicillins.

Cellulitis — penicillin.

Acne — tetracyclines.

6.3.1 PENCILLINS

6.3.1.1 BENZYL & PHENOXYMETHYL PENCILLIN

6.3.1.1.1 BENZYL PENCILLIN (Penicillin G)

Indication : Pneumococcal, streptococcal, staphylococcal and meningococcal infections, venereal diseases (gonorrhoea and syphilis), actinomycosis, anthrax, diphtheria, tetanus and gas gangrene. Penicillin prophylaxis in rheumatic fever and dental procedures.

Prep/Route/Dose : Inj : 500,000U/ml
1,000,000 U/ml
I.M. or I.V.

Dose: Varies with disease type and severity.

- S.E. : Hypersensitivity.
- S.P. : Avoid intrathecal administration. High dose may lead to accumulation of electrolytes (Na or K)

Brand/Cost

BENZYL

PENICILLIN : Inj: 500,000 U: Rs. 3.22 for 1 vial
Alembic) 1,00,000 U: Rs. 4.62 for 1 vial

6.3.1.1.2 PROCAINE PENICILLIN

Indication : Syphilis, gonorrhoea, gas gangrene following amputation.

Prep/Route/Dose : Inj: 400,000 U/vial
2,000,000 U/vial
500,000 to 1,000,000 U IM daily
(Not for I.V use)

- S.E. : Hypersensitivity.
- S.P. : Avoid intrathecal administration. High dose may lead to accumulation of electrolytes (Na or K)

Brand/Cost

PROCAINE

PENICILLIN : 400,000 U vial: Rs. 2.05
(IDPL) 2,000,000 U vial: Rs. 5.21

6.3.1.1.3 BENZATHINE PENICILLIN

Indication : Penicillin-sensitive infections; prophylaxis

Prep/Route/Dose : Inj: 600,000 U per vial
1,200,000 U per vial
2,400,000 U per vial

Brand/Cost

PENIDURE : LA 6, 12, 24
(Wyeth) Cost: LA 6 : Rs. 2.50 per vial
LA 12 : Rs. 4.00 per vial
LA 24 : Rs. 7.00 per vial

LONGACILLIN : Inj: 600,000 U: Rs. 2.69 for 1 vial.
(Hindustan 1,200,000 U: Rs. 4.66 for 1 vial
Antibiotics) 2,400,000 U: Rs. 8.43 for 1 vial

6.3.1.1.4 PHENOXYMETHYL PENICILLIN (Penicillin V)

Indication : Respiratory tract infections in children, streptococcal tonsillitis; continuing treatment after one or more injection of benzyl penicillin, when clinical response has begun.
It should not be used for meningococcal or gonococcal infections. Can be used for prophylaxis against streptococcal infections following rheumatic fever.

Prep/Route/Dose : Tab : 250mg
Syrup: 125mg/5ml (2,000,000 U/5ml)
Dose : Adult: 125–250mg every 4 hours
Child: 15–30mg/kg/24 hours in 4 doses.

S.P./C.I. : As for Benzypenicillin

Brand/Cost

CRYSTAPEN : Tab: 400,000 U: Rs. 5.42 for 6
(Glaxo)

CRYSTAPEN V : Granules for syrup: 125mg/5ml:
(Glaxo) Rs. 9.55 for 32.5g

6.3.1.2 PENICILLINASE RESISTANT PENCILLIN

6.3.1.2.1 CLOXACILLIN

Indication : Staphylococcal infections producing penicillinase; mixed infections.

Prep/Route/Dose : Caps : 250mg & 500mg
Syrup: 125mg/5ml of constituted syrup
Inj : 250mg & 500mg/vial
Dose : 250–500mg/kg in divided doses.

S.P./C.I. : As for PENICILLIN

Brand/Cost

KLOX : Inj : 250mg vial: Rs. 5.22
(Lyka) 500mg vial: Rs. 7.10
Caps : 250mg: Rs. 17.82 for 12
500mg: Rs. 34.18 for 12
Syrup: 125mg/5g: Rs. 10.24 for 24g

6.3.1.3 BROAD SPECTRUM PENICILLINS

6.3.1.3.1 AMPICILLIN DI

Indication : Urinary tract infections, otitis media, chronic bronchitis, typhoid fever, gonorrhoea.

Prep/Route/Dose : Caps : 250mg & 500mg
Syrup: 125mg/5ml of constituted syrup
Inj : 250mg & 500mg/vial
Dose : 250–1000mg, p.o or IV, 6th hourly.

S.P./C.I. : As for Benzyl Penicillin; Erythematous rash in glandular fever and chronic lymphatic leukaemia.

Brand/Cost

AMPICILLIN : Caps: 250mg: Rs. 420.00 for 500
(CMS-I)

AMPILIN : Caps : 250mg: Rs. 6.40 for 4;
 (Lyka) 500mg: Rs. 21.37 for 8
 Inj : 100mg: Rs. 4.25 per vial;
 250mg; Rs. 5.40 per vial;
 500mg; Rs. 7.48 per vial
 Syrup: 125mg/5ml: Rs. 8.32 for 40ml
 250mg/5ml: Rs. 13.55 for 40ml

ROSCILLIN : Caps : 250mg: Rs. 18.19 for 10
 500mg: Rs. 34.12 for 10
 Inj : 250mg: Rs. 4.51 vial + diluent;
 500mg: Rs. 7.60 vial + diluent
 Suspension: 125mg/5ml: Rs. 10.81 for 40ml;
 250mg/5ml: Rs. 16.88 for 40ml.

6.3.1.3.2 BACAMPICLLIN

Indication : As for Ampicillin

Prep/Route/Dose : Tab : 400mg
 Dose: 400mg, 2-3 times daily

S.P./C.I. : As for Benzyl Penicillin.

Brand/Cost

PENGLOBE : Tab: Rs. 12.77 for 4
 (Astra-IDL)

6.3.1.3.3 AMOXYCILLIN

Indication : As for ampicillin

Prep/Route/Dose : Caps : 250mg & 500mg
 Syrup: 125mg/5ml
 Dose : 250-500mg every 8 hours
 Child : 40mg/kg in 3 divided doses.

S.P./C.I. : As for Benzyl Pencillin

Brand/Cost

MOX : Caps : 250mg: Rs. 6.20 for 3
 (Gufic) 500mg: Rs. 10.92 for 3
 Syrup: 125mg/5ml: Rs. 7.10 for 30ml
 Inj : 100mg vial: Rs. 4.12
 250mg vial: Rs. 5.96
 500mg vial: Rs. 9.04

LAMOXY : Caps: 250mg: Rs. 6.66 for 3
 (Lyka) 500mg: Rs. 11.84 for 3

6.3.1.4. ANTIPSEUDOMONAL PENICILLINS**6.3.1.4.1. CARBENICILLIN**

Indication : Pseudomonas aeruginosa and proteus spp. infections.

Route/Prep/Dose : Inj: 1g and 5g vial
 Dose: In severe systemic infections, 5g slow I.V. every 4-6 hours.
 Child: 250-400mg/kg daily in divided doses.

S.P./C.I. : As for BENZYL PENCILLIN

Brand/Cost

CARBELIN (Lyka) : Inj: 1g vial: Rs. 18.39

PYNPEN

(German Remedies): Inj: 5g vial: Rs. 96.40
 1g vial: Rs. 226.78 for 10

6.3.2. SULPHONAMIDES & TRIMETHOPRIM**6.3.2.1. SALICYLAZO SULPHAPYRIDINE (SULPHASALAZINE)**

Indication : Ulcerative colitis; acute Crohn's disease.

- Route/Prep/Dose : Tab: 500mg
 Acute attack: 1-2g, 4 times daily
 Maintenance: 500mg, 3-4 times daily
 Child: over 2 years: 40-60mg/kg daily
 Maintenance: 20-30mg/kg/daily
- S.E. : Nausea, vomiting, rashes, haematological abnormalities; hypersensitivity reactions.
- C.I. : Hypersensitivity to sulpha drugs; jaundice; renal insufficiency; pregnancy; lactation.

Brand/Cost

SALAZOPYRIN

(Carter Wallace) : Tab: Rs. 18.74 for 10

**6.3.2.2. SULPHAMETHOXAZOLE = TRIMETHOPRIM
 (COTRIMOXAZOLE)**

Indication : Typhoid fever, other salmonella infection, bone and joint infections due to H. influenzae, urinary tract infections, sinusitis, exacerbations of chronic bronchitis, gonorrhoea in penicillin-allergic patients.

Route/Prep/Dose : Tab: T. 80mg + S. 400 mg. &
 T. 160mg + S. 800 mg.
 Suspension: 40mg T + 200mg S./5ml
 Inj: (I.V.) 80mg T + 400mg S/5ml amp.
 Adult: 2 tab BD or DS 1BD
 Child: 6-8mg/kg of Trimethoprim in 2 divided dose.

S.P./C.I. : As for Sulphonamides

CO-TRIMOXAZOLE

(CMS-I)

: Tab: S.S.: Rs. 360.00 for 1000
 D.S.: Rs. 365.00 for 500

SEPTRAN
(Burroughs
Wellcome)

: Tab: Rs. 5.83 for 10
Paediatric Suspension: Rs. 6.62 for 50ml.
Paediatric Tab: Rs. 1.95 for 10

BACTRIM (Roche) : Inj. I.V. 80+400mg/5ml: Rs. 10.72 for 5 amps.
I.M. 160+200mg/5ml: Rs. 34.51 for 10 amps.
Suspension: 40+200mg/5ml: Rs. 7.38 for 50ml
Tab: 80+400mg: Rs. 62.62 for 100 Rs. 11.36 for 10
Bactrim Paediatric: 20+100mg: Rs. 20.51 for 100

6.3.3. CEPHALOSPORINS

6.3.3.1 CEPHALEXIN

Indication : Infections sensitive to Cephalexin. Urinary tract infections which do not respond to other drugs or which occur in pregnancy.

Route/Prep/Dose : Caps : 250mg & 500mg
Syrup: 125mg/5ml
Dose : 250–500mg 6 hourly
Child : 50–100mg/kg in divided doses.

S.P. : Renal impairment

C.I. : Hypersensitivity to Cephalosporin

SPORIDEX
(Ranbaxy)

: Caps : 250 mg: Rs. 33.88 for 20
500mg: Rs. 63.72 for 10
Drops : 100mg/ml: Rs. 14.70 for 10ml
Suspension: 125mg/5ml: Rs. 14.87 for 40ml

SEPEXIN (Lyka) : Caps : 250mg: Rs. 9.58 for 4 caps
500mg: Rs. 17.70 for 4 caps
Syrup: 125mg/5ml: Rs. 16.06

6.3.3.2 CEPHAZOLIN

Indication	:	Infections with sensitive Gram positive and Gram negative bacteria.
Route/Prep/Dose	:	Inj: 500mg/vial; 1g/vial Adult: 500mg-1g, 2 or 3 times daily Child: 15-60mg/kg/day in divided doses.
S.P.	:	Renal impairment
C.I.	:	Hypersensitivity to Cephalosporin
Brand/Cost	:	
REFLIN (Ranbaxy)	:	Inj: 0.5g vial: Rs. 23.13 1.0g vial: Rs. 43.25
CEFAEZIN (Rallis)	:	Inj: 500mg: Rs. 24.50 for 10ml vial Rs. 44.63 for 10ml vial

6.3.3.3 CEFOTAXIME

Indication	:	Severely ill patients with sensitive Gram positive and Gram negative organisms.
Route/Prep/Dose	:	Inj : 250mg & 1g vial Dose: 1-2g, IM or IV 12 hourly Max. 12g daily in 3-4 doses. Child : 50-100mg/kg in 2 doses Neonate: 50mg/kg in 2 doses.
S.P.	:	Known anaphylactic response to penicillin; severe renal failure; pregnancy; lactation.
Brand/Cost	:	
OMNATAX (Hoechst)	:	250mg vial: Rs. 44.34 1g vial: Rs. 156.00
CLAFORAN (Roussel)	:	1g vial: Rs. 156.00

6.3.3.4 CEFTAZIDIME

Indication : Serious pseudomonas and other gram negative infections

Route/Prep/Dose : Inj : 250mg & 1g vial
Dose: 1g 8 hourly IV.

S.P. : Same as for Cefotaxime

Brand/Cost

FORTUM (Glaxo)

6.3.4. AMINOGLYCOSIDES

6.3.4.1 GENTAMICIN DI R

Indication : Septicaemia and neonatal sepsis, meningitis and other CNS infections, biliary tract infections, acute pyelonephritis or prostatitis, endocarditis by streptococcus viridans or faecalis (along with a penicillin).

Prep/Route/Dose : Inj : 40mg/ml – 2ml vial
Dose: 1mg/kg BD or TID. I.V. or I.M.
Child: 5mg/kg/day in 2 divided doses.

S.E. : Ototoxicity; nephrotoxicity

S.P. : Pregnancy; myasthenia gravis; renal impairment

Brand/Cost

GARAMYCIN : Inj: 40mg per ml: Rs. 7.36 for 1.5ml amp.
(Fulford) Rs. 9.82 for 2ml vial
Paediatric: 10mg per ml: Rs. 4.74 for 2ml vial.

LYRAMYCIN : Inj: 40mg per ml: Rs. 7.04 for 2ml
(Lyka) Rs. 20.51 for 5 ml
Paediatric: 10mg per ml: Rs. 4.46 per 2ml.

6.3.4.2 KANAMYCIN P R

Indication	:	Fulminant urinary tract infection; septicaemia, meningitis, bacterial endocarditis.
Route/Prep/Dose	:	Inj : 500mg/vial 1g/vial Dose: 5-7.5mg/kg BD, IM
S.E.	:	Same as Gentamicin
S.P.	:	Impaired renal function
C.I.	:	Hypersensitivity; Pregnancy.

Brand/Cost

KANCIN	:	Inj: 0.5g vial: Rs. 9.44
(Alembic)		1g vial: Rs. 16.71

6.3.4.3 NEOMYCIN SULPHATE R

Indication	:	Bowel sterilization before surgery.
Route/Prep/Dose	:	Caps: 350mg Dose: 1g every 4 hours.
S.E./S.P./C.I.	:	As under Gentamicin. Avoid in renal impairment.

6.3.4.4 STREPTOMYCIN DI

Indications	:	Tuberculosis; Streptococcal endocarditis; plague
Route/Prep/Dose	:	Parenteral Refer to 6.3.10.5 as indicated

6.3.5 TETRACYCLINES

6.3.5.1 TETRACYCLINE D I P R

- Indication : Acute exacerbations of chronic bronchitis; infections due to brucella, chlamydia, mycoplasma and rickettsia.
- Route/Prep/Dose : Caps: 250mg & 500mg
Dose: Adult: 1g/day in 2-4 divided doses.
- S.E. : Nausea, vomiting, diarrhoea.
- C.I. : Pregnancy; hypersensitivity; children below 12 years; renal failure.

Brand/Cost

- TETRACYCLINE : Caps: 250mg: Rs. 415.00 for 1000
(CMS-I)
- TETRACYCLINE : Caps: 250mg: Rs. 60.47 for 100
(IDPL)

6.3.5.2 DOXYCYCLINE

- Indication : As for tetracycline; chronic prostatitis.
- Route/Prep/Dose : Caps: 100mg
Dose: 200mg first day; then 100mg OD
In severe infection 200mg daily for 5 days
- S.E. : As for tetracycline

Brand/Cost

- TETRADOX : Caps: 100mg: Rs. 18.71 for 10
(Ranbaxy)
- MARTIDOX : Caps: 100mg: Rs. 17.18 for 10
(Martel Hammer) Rs. 15.22 for 4

6.3.6 OTHER ANTIBACTERIAL DRUGS

6.3.6.1 CHLORAMPHENICOL D I P L

- Indication : Typhoid fever and life-threatening infections, particularly by *Haemophilus influenzae*. Toxic; reserved for these indications only. Do not use for other systemic infections.
- Route/Prep/Dose : Caps : 250mg
Syrup: 150mg/5ml
Inj : 1g & 2g/vial
Dose : In typhoid 50mg/kg/day till afebrile, then reduce to 30mg/kg/day, for total period of 2 weeks.
Child : 50–100mg/kg in divided doses.
- S.E. : Leucopenia; thrombocytopenia; irreversible aplastic anemia; peripheral neuritis; optic neuritis; grey baby syndrome.
- C.I. : Pregnancy; breast feeding; neonates.

Brand/Cost

CHLOROMYCETIN : Caps: 100mg: Rs. 8.80 for 12
500mg: Rs. 6.06 for 6
(Parke–Davis)
Inj : IM: 1g vial: Rs. 2.94;
2g vial: Rs. 3.84

PARAXIN : Caps : 250mg: Rs. 7.17 for 10
500mg: Rs. 7.54 for 6
(Boehringer–Knoll)
Dragees : 250mg: Rs. 66.77 for 100
Granules: 125mg/ml: Rs. 13.34 for 60ml

6.3.6.2 ERYTHROMYCIN D I

- Indication : Alternative to penicillin in hypersensitive patients; sinusitis; diphtheria and whooping cough prophylaxis; chronic prostatitis.

Route/Prep/Dose : Tab : 250mg
Granules: 125mg/5ml when reconstituted.
Dose : 250mg/6 hourly
500mg/6 hourly
Child: 40mg/kg in divided doses.

S.E. : Nausea; vomiting; diarrhoea

S.P. : Hepatic impairment.

Brand/Cost

ERYTHROCIN : Granules: when mixed 125mg/5ml:
(Abbot) Stearate Rs. 14.92 for 45ml
Sachets : 200mg: Rs. 10.02 for 4
Tab 100mg: Rs. 7.92 for 10
250mg: Rs. 18.88 for 10
500mg: Rs. 17.70 for 6

ALTHROCIN : Granules: 100mg/ml: Rs. 10.62 for 10ml
(Alembic) Estolate Liquid : 25mg/ml: Rs. 16.18 for 60ml
Tab 100mg: Rs. 8.02 for 10
250mg: Rs. 18.02 for 10
500mg: Rs. 28.29 for 10

6.3.6.3 METRONIDAZOLE

Indication : Anaerobic infections
See under 6.2.2.

6.3.7 4-QUINOLONES

6.3.7.1 NALIDIXIC ACID P R

Indication : Gram negative infections of gastro-intestinal and urinary tracts

Route/Prep/Dose : Tab : 500mg
Dose: 1g every 6 hours for 7 days, reducing to
500mg every 6 hours.
Child: 60mg/kg/day.

- S.E. : Nausea; vomiting; diarrhoea; allergic reaction; myalgia; jaundice; convulsions.
- C.I. : Infants below 3 months; epilepsy; pregnancy.
- S.P. : Impaired renal or hepatic function; breast feeding.

Brand/Cost

- GRAM-O-NEG (Ranbaxy) : Tab : 500mg: Rs. 10.61 for 4
Syrup: 300mg/5ml: Rs. 14.33 for 30ml
- WINTOMYLON (Win-Medicare) : Tab: Rs. 178.50 for 7x8 tabs
Suspension: 300mg/5ml: Rs. 13.90 for 30ml.

6.3.7.2 NORFLOXACIN P

- Indications : Gram negative infections of gastro-intestinal and urinary tract
- Route/Prep/Dose : Tab : 400mg
Dose: 400mg BD, 7-10 days.
- C.I. : Hypersensitivity
Quinolone

Brand/Cost

- UROFLOX (Torrent) : Tab: 400mg: Rs. 15.90 for 2
- NORFLOX (Cipla) : Tab: 400mg: Rs. 31.00 for 4

6.3.7.3 CIPROFLOXACIN P

- Indication : Severe gram positive and gram negative infections

Route/Prep/Dose : Tab: 250mg; 500mg
 Inj: 2mg/ml for infusion
 250-750mg BD
 Single dose of 250mg for gonorrhoea

Brand/Cost : Tab: 250mg: Rs. 24.00 for 2 tabs
CIPROBID : Tab: 500mg: Rs. 40.00 for 2 tabs
 (Cadila) Inj: 100mg/10ml: Rs. 30.00

CIFRAN : Tab: 250mg: Rs. 43.00 for 4 tabs
 (Ranbaxy) Inj: 100mg/50ml: Rs. 50.00
 200mg/100ml: Rs. 80.00

6.3.8 URINARY TRACT ANTIBIOTICS

6.3.8.1 NITROFURANTOIN

Route/Prep/Dose : Tab : 100mg
 Suspension: 25mg/5ml
 Dose : 50-100mg, 3-4 times/day after food.
 Child : 6mg/kg/day in 4 divided doses.

S.E. : Gastro-intestinal disturbances; polyneuritis;
 deafness; blood dyscrasia.

C.I. : Renal failure

Brand/Cost
FURADANTIN : Tabs : Rs. 3.91 for 12
 (Eskayef) Suspension: 25mg/5ml: Rs. 5.56 for 60ml

6.3.8.2 METHANAMINE MANDALATE R

Route/Prep/Dose : Tab : 500mg, 1g
 Dose: Adult: 1g 4 times daily
 Child: 500mg, 4 times daily

C.I. : Renal insufficiency

S.P. : Acts only in acid pH

Brand/Cost

MANDLAMINE : Tab: 0.5g: Rs. 11.37 for 30
(Warner) 1.0g: Rs. 10.94 for 15

6.3.9 ANTILEPROSY DRUGS

6.3.9.1 CLOFAZIMINE H P

Route/Prep/Dose : Caps: 100mg; 50mg
Dose: 50mg daily and 300mg once monthly (as part of multidrug regimen)

S.E. : Nausea; giddiness; headache; diarrhoea; red colouration of skin and urine; blue black discolouration of lesions.

C.I. : Pregnancy (1st trimester)

S.P. : Hepatic or renal damage.

Brand/Cost

HANSEPRAN : Caps: 100mg: Rs. 180.92 for 100
(S.G. Pharma)

CLOFOZINE : Caps: 50mg: Rs. 25.57 for 30
(Astra-IDL) 100mg: Rs. 179.46 for 100

6.3.9.2 DAPSONE (DDS) P

Prep/Route/Dose : Tab : 25mg, 50mg & 100mg
Dose: 100mg daily as part of multidrug regimen.

S.E. : Allergic dermatitis; neuropathy; anorexia; anaemia; hepatitis; agranulocytosis.

C.I. : 1st trimester of pregnancy

Brand/Cost

DAPSONE : Tab: 100mg: Rs. 60.00 for 1000
(CMS-I)

DAPSONE : Tab: 25mg: Rs. 11.93 for 1000
 (Acila) 50mg: Rs. 15.74 for 1000
 100mg: Rs. 27.75 for 1000

DAPSONE : Tab: 25mg: Rs. 14.63 for 1000
 (Burroughs 50mg: Rs. 24.14 for 1000
 Wellcome) 100mg: Rs. 46.48 for 1000

6.3.9.3. RIFAMPICIN H DI

Route/Prep/Dose : Caps: 300mg, 450mg
 Dose: 600mg, once monthly (450mg for those weighing less than 35kg) as part of multidrug regimen.

S.E. : Gastro-intestinal symptoms; orange red colouration of urine and body secretion; influenzal syndrome; hepatic reactions; urticaria; thrombocytopenic purpura; acute renal failure.

C.I. : Jaundice

S.P. : Reduce dose in hepatic impairment, alcoholism and pregnancy.

Brands/Cost

RIFAMPICIN : Tab 300mg: Rs. 615.00 for 500
 (CMS-I) 450mg: Rs. 920.00 for 500

RIFAMYCIN : Caps: 450 mg: Rs. 11.80 for 4
 (Biochem)

TIBRIM : Caps: 150mg: Rs. 103.46 for 100
 (Ranbaxy) 300mg: 7.82 for 4
 450mg: Rs. 8.70 for 3

RIMPIN : Caps: 150mg: Rs. 4.86 for 4
 (Lyka) 300mg: 8.94 for 4
 450mg: Rs. 12.50 for 4

NATIONAL LEPROSY ERADICATION PROGRAMME

A. Dapsone monotherapy

1. Multibacillary leprosy

Dapsone: Adult: 100mg daily
Child: 6–14 years: 50mg daily

Continue till the patient becomes clinically inactive and bacteriologically negative and thereafter for 5 years.

2. Paucibacillary leprosy

Dapsone: Adult: 100mg daily
Child: 6–14 years: 50mg daily
0–5 years: 25mg daily

Treatment continued till patient is clinically inactive and then continued for one year.

B. Multidrug therapy

1. Multibacillary leprosy

	Adult	Child 10–14 years	Child 6–9 years
Intensive phase (14 days)			
Rifampicin	600mg daily	450mg daily	300mg daily
Clofazimine	100mg daily	50mg daily	50mg daily
Dapsone	100mg daily	50mg daily	50mg daily
Continuation phase (minimum duration: 2 years)			
Rifampicin	600mg once monthly	450mg once monthly	300mg once monthly
Clofazimine	300mg once monthly 50mg daily	150mg once monthly 50mg alter- nate days	100mg once monthly 50mg twice daily

Dapsone	100mg daily	50mg daily	25mg daily
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If in the adult, the body weight is less than 35kg, the dose of Rifampicin is reduced to 450mg (instead of 600mg).

2. Paucibacillary leprosy

	Adult	Child 6-14 years	Child 0-5 years
Rifampicin	600mg once monthly	450mg once monthly	300mg once monthly
Dapsone	100mg daily	50mg daily	25mg daily

Adult: Body weight less than 35kg: reduce dose of Rifampicin to 450mg.

6.3.10 ANTI-TUBERCULOSIS DRUGS

Many drug regimes are practised. The National Programme can be followed where possible. But it is important to remember that combination of at least 3 drugs should be used to delay resistance.

The primary drugs used for the initial phase are Rifampicin, INaH, Pyrizanamide, Ethambutol and Streptomycin in varying combination. During the continuation phase, two drug combination is used. The choice of drugs, duration of treatment etc. vary with the intensity of disease, cost factors, drug resistance, prior therapy etc. For respiratory disease regardless of its extent it is generally believed that combination of Rifampicin and Isoniazid daily for 9 months is sufficient. Where meningeal involvement is present, Pyrizanamide is added. It is important to look for hepatotoxic effects as both INaH and Rifampicin and Pyrizanamide are hepatotoxic. Similarly in patients on Ethambutol, periodic visual examination should be done.

Failure of therapy in most cases is either due to poor patient compliance or inappropriate dosage regimes. Hence special care should be taken to see that adequate treatment for adequate periods is given.

6.3.10.1 ETHAMBUTOL

- Route/Prep/Dose : Tab : 200mg, 400mg, 600mg & 800mg
Dose: Adult: 15mg/kg daily
Child: 25mg/kg daily — 2 months, then
15mg/kg daily
- S.E. : Optic neuritis; visual disturbance; peripheral neuritis (regular eye check up advised).
- S.P. : Reduce dose in renal impairment.
- C.I. : Young children; elderly patients; optic neuritis.

Brand/Cost

- ETHAMBUTOL : Tab: 400mg: Rs. 492.00 for 1000
(CMS-I) 800mg: Rs. 565.00 for 600
- MYAMBUTOL : Tab: 200mg: Rs. 4.18 for 10
(Lederle) 400mg: Rs. 6.76 for 10
800mg: Rs. 7.80 for 6
- MYCOBUTOL : Tab: 200mg: Rs. 4.18 for 10
(Cadila) 400mg: Rs. 6.76 for 10
600mg: Rs. 9.81 for 10
800mg: Rs. 12.82 for 10
1000mg: Rs. 13.11 for 10
- THEMIBUTOL : Tab: 200mg: Rs. 36.60 for 100
(Themis) 400mg: Rs. 59.20 for 100
600mg: Rs. 85.90 for 100
800mg: Rs. 112.20 for 100
1000mg: Rs. 158.20 for 100

6.3.10.2 ISONIAZID

- Route/Prep/Dose : Tab : 100mg, 300mg
Dose: Adult: 300mg/daily
Child: 10-20mg/kg/daily in divided doses.

- S.E. : Nausea, vomiting, hypersensitivity reactions, rashes, peripheral neuritis.
- S.P. : Impaired renal and hepatic function; epilepsy; alcoholism; breast feeding.

Brand/Cost

ISONEX : Tab: 100mg: Rs. 7.40 for 100
(Pfizer)

ISONIAZIDE : Tab: 100mg: Rs. 7.40 for 100
(Haffkine) 300mg: 15.43 for 100

6.3.10.3 PYRAZINAMIDE H

Route/Prep/Dose : Tab : 500mg, 750mg
Dose: 25mg/kg/day

S.E. : Hepatotoxicity; nausea, vomiting; arthralgia; sideroblastic anaemia; urticaria.

S.P. : Impaired renal function; diabetes and gout.
Advise periodic liver function tests.

Brand/Cost

COPYRAZIN : Tab: 500mg: Rs. 15.30 for 10
(PCI) 750mg: Rs. 20.65 for 10
1000mg: Rs. 26.00 for 100

LYNAMIDE : Tab: 500mg: Rs. 15.30 for 10
(Lyka) 750mg: Rs. 21.90 for 10

COXAMIDE : Tab: 500mg: Rs. 15.00 for 10
(Aristo) 750mg: Rs. 22.00 for 10

6.3.10.4 RIFAMPICIN DI H

Route/Prep/Dose : Caps: 150mg, 300mg, 450mg
Dose: 450-600mg (about 10mg/kg) daily
Child: 10-20mg/kg/daily
1 hour before breakfast.

S.E./S.P./C.I./

Brand/Cost : See 6.3.9.3.

6.3.10.5 STREPTOMYCIN R

Route/Prep/Dose : Inj : 1g vial; 750mg vial
Dose: 1g daily IM
Age above 40 years: 750mg daily
Small patient: 500mg daily
Child: 20–40mg/kg body weight

S.E. : As for aminoglycosides; also hypersensitivity reactions; paraesthesia of mouth.

S.P./C.I. : As for aminoglycosides.

Brand/Cost

AMBISTRYN--S : Inj: 1g vial: Rs. 4.01
(Sarabhai) 0.75g vial: Rs. 3.45

6.3.10.6 THIA CETAZONE \pm INH H

Route/Prep/Dose : Tab : Thiacetazone 150mg INH 300mg
Dose: Adult: 1 tab daily

S.E. : Rash

C.I. : Hepatic or renal failure; psychosis.

Brand/Cost

ISOKIN-T FORTE : Tab: Rs. 2.40 for 10
(Warner)

6.4 ANTIFILARIAL DRUGS

6.4.1 DIETHYLCARBAMAZINE

Route/Prep/Dose : Tab: 50mg, 100mg
Syrup: 50 mg/5ml – 60ml
120mg/5ml – 60ml

Dose: Filariasis; 2mg/kg single dose 1st day;
2 such doses on 2nd day; 3 doses daily
thereafter for 3-4 weeks.

Tropical eosinophilia: 6mg/kg daily in 3 divided
doses for 1 month; repeat 2 such courses at
interval of 3 months.

S.E. : Transient headache; dizziness; fever; urticaria;
conjunctivitis; keratitis as allergic response due
to destruction of micro filaria.

Brand/Cost

DIETHYL

CARBAMAZINE

(CMS-I)

: Tab: 100mg: Rs. 82.00 for 100

BANOCIDE

(BW)

: Tab: 50mg: Rs. 0.53 for 10

Syrup: 120mg per 5ml: Rs. 3.37 for 60ml

Banocide forte: 100mg Tab: Rs. 0.59 for 10

Banocide paediatric syrup: 50mg per
5ml: Rs. 2.80 for 60ml

HETRAZAN

(Lederle)

: Tab: 50mg: Rs. 0.75 for 10

100mg: Rs. 8.90 for 100

Syrup: 120mg per 5ml: Rs. 3.70 for 57ml

NATIONAL FILARIA CONTROL PROGRAMME

Diethylcarbamazine: 6mg/kg body weight daily — 12 doses to be
completed in 2 weeks (six days in a week).

Age group

Single dose

Above 18 years

300mg

12-17 years

225mg

6-11 years

150mg

2-5 years

75mg

1 year

30mg

S.P.: Not to be administered on empty stomach.

C.I.: Infants, infirm and old persons, pregnancy, chronically ill (heart, lung, kidney).

S.E.: Fever, nausea, vomiting, gastro-intestinal disturbances, allergic rashes, lymphangitis.

6.5 ANTIFUNGAL

6.5.1 AMPHOTERICIN B R

Route/Prep/Dose : Powder for injection: 50mg/vial
Dose: 250 microgram/kg, gradually increasing if tolerated to 1mg/kg daily, or 1.5mg/kg daily on alternate days for 4-8 weeks.

S.E. : Fever; anorexia; nausea; vomiting; hypokalaemia; nephrotoxicity; tinnitus.

S.P. : Avoid use with other nephrotoxic drugs. Renal function to be monitored.

Brand/Cost

FUNGIZONE : Inj: 50mg vial: Rs. 28.45
(Squibb)

6.5.2 GRISEOFULVIN H P

Route/Prep/Dose : Tab : 125mg
Dose: Adult: 4 tabs daily
Child: 2 tabs daily with meals.

S.E. : Headache; nausea; vomiting; rashes; photosensitivity.

C.I. : Liver failure; porphyria; pregnancy.

Brand/Cost

GRISOVIN : Tab: 125mg: Rs. 4.49 for 10
(Glaxo)

IDIFULVIN : Tab: 125mg: Rs. 4.12 for 10
(IDPL)

6.5.3 NYSTATIN

Route/Prep/Dose : Tab : 500,000 U
Dose: 1 tab 10

S.E. : Nause: vomiting; diarrhoea

6.5.4 KETOCONAZOLE H P

Route/Prep/Dose : Tab : 200mg
Dose: Adult: 200mg once daily for 14 days.
Child: above 2 years: 3.3–6.6mg/kg
once daily.

S.E. : Hepatitis; rashes; pruritis.

C.I. : Pregnancy, hepatic impairment

Brand/Cost

FUNGICIDE : Tab: 200mg: Rs. 65.00 for 10
(Torrent)

6.6 ANTI-LEISHMANIASIS DRUGS

6.6.1 SODIUM STIBOGLUCONATE H R

Route/Prep/Dose : Inj : 100mg/ml
Dose: 10mg/kg daily for 30 days
by IM or IV injection
For skin lessions: 10 days treatment

S.E. : Anorexia, vomiting, cough, substernal pain.

C.I. : Pneumonia; myocarditis; nephritis; hepatitis.

Brand/Cost

SODIUM

ANTIMONY

GLUCONATE

: Inj: 333mg/ml: Rs. 34.84 for 30ml

(Albert David)

STIBANATE

: Inj: 100mg/ml: Rs. 29.53 for 30ml

(Gluconate)

6.7 ANTIMALARIAL DRUGS

CHLOROQUINE is the drug of choice for the treatment of benign malaria. For clinical cure or suppression for symptoms, chloroquine 600mg initially followed by a single dose of 300mg after 6–8 hours and followed by 300mg daily for two days will suffice.

Though chloroquine alone is sufficient for falciparum malaria, in the treatment of benign tertian malaria caused by *P. vivax*, additional treatment with primaquine is required for radical cure to destroy parasites in liver. Primaquine is given as 15mg daily for 14–21 days.

A number of falciparum malaria patients are resistant to chloroquine. For these, quinine tablets 600 mg thrice a day for 7 days are given with a single dose of 300 mg 3 tablets of Fansidar.

CHEMOPROPHYLAXIS: It is important to remember prophylaxis is relative and not absolute. Prophylaxis should be started one week prior to and continued during stay in endemic area and upto 4 weeks after. 200mg of proguanil daily with chloroquine 300mg once weekly is recommended.

National Programme

“Text book of Social and Preventive Medicine”, Park & Park to be referred for National Programmes of Malaria, Leprosy, Tuberculosis and Filariasis.

6.7.1 CHLOROQUINE

Route/Prep/Dose : Tab : 150mg of base
Dose: 600mg as initial dose following 300mg after 6 hours; then 300mg OD on 2nd & 3rd day.
Child: 10mg/kg followed 6 hours later by 5mg/kg and 5mg/kg ODx3 days.
Inj : 40mg base/ml-5ml
Dose: 200-300mg base slow I.V. infusion over 4 hours. For children IV infusion 5mg/kg of base over 4 hrs. If I.V. not possible, I.M. 3mg/kg base repeated 8 hourly until oral therapy possible.
Syrup: 100mg/10ml.

S.E. : Headache; nausea; vomiting; diarrhoea; rashes; pruritus; psychotic episodes; convulsion; corneal & retinal changes with high doses (prolonged).

S.P. : Renal and hepatic dysfunction; psoriasis; porphyria; Ocular examination in long use.

Brand/Use

CHLOROQUINE : Tab: 250mg: Rs. 205.00 for 1000
(CMS-I)

RESOCHIN : Tab: 250mg: Rs. 32.88 for 100
(Bayer)

NIVAQUINE : Tab : 150mg: Rs. 3.35 for 10
(M & B)
Syrup: 50mg per 5ml: Rs. 6.00 for 50 ml
Inj : 40mg per ml, 2ml amp.: Rs. 12.20 for 10 amps.

6.7.2 AMODIAQUINE

Route/Prep/Dose : Tab : 200mg base
Dose: Same as Chloroquine

S.E. : Nausea; vomiting; diarrhoea; agranulocytosis; peripheral neuropathy.

S.P./C.I. : As under Chloroquine.

Brand/Cost

CAMOQUIN : Tab: 0.2g: Rs. 2.88 for 10
(P.D. & Co)

6.7.3 PRIMAQUINE

Route/Prep/Dose : Tab : 2.5mg
Dose: 15mg daily for 14 days
Child: 7.5mg daily for 14 days (for radical cure in P. vivax and P. orale).

S.E. : Anorexia; nausea; bone marrow depression; methaemoglobinuria; haemolytic anaemia.

S.P. : In G6PD deficiency can cause haemolysis.

Brand/Cost

PRIMAQUINE
PHOSPHATE : Tab: 2.5mg: Rs. 4.54 for 100
(IDPL)

6.7.4 QUININE P

Route/Prep/Dose : Tab : 300mg
Inj : 300mg/ampoule.
Dose: Adult: 600mg every 8 hours, for 5 days.
Child: below 1 year: 1/10 adult dose.
Older child: age x adult dose/20
Inj (Chloroquin resistant seriously ill patient):
I.V. infusion 10mg/kg over 4 hours —
repeat 8 hourly x 3 doses.
Max: not more than 1.8g in 24 hours
Children above 3 months: I.V. or IM
quinine; IM dose 5mg/kg.

- S.E. : Cinchonism; tinnitus; headache; nausea; abdominal pain; rashes; visual disturbances; hypersensitivity reaction.
- S.P. : Atrial fibrillation; conduction defects; heart block; pregnancy.

Brand/Cost

QUININE : Inj: 2ml amp: Rs. 19.37 for 10
(Bengal Immunity)

QUININE : 0.3g per ml: Rs. 28.64 for 25 amps.
(GLUCONATE) 0.6g per 2ml: Rs. 47.51 for 25 amps.

6.7.5 SULFADOXINE + PYRIMETHAMINE P

Route/Prep/Dose : Tab : 500mg S + 25mg P
Dose: After treatment with Quinine — 3 tabs single dose (adult); for prophylaxis: 2 tabs/week.

S.E. : Bone marrow depression with prolonged treatment; rashes.

S.P. : Hepatic or renal dysfunction, pregnancy

Brand/Cost

RINODAR : Tab: 6.95 for 2
(Anglo French)

6.7.6 SULPHAMETHOPYRINE + PYRIMETHAMINE P

Route/Prep/Dose : Tab: 500mg S + 25mg P

See literature

Brand/Cost

METAKELFIN : Tab: Rs. 7.69 for 2
(Walter-Bushnell) Suspension: 500mg + 25mg per 10ml: Rs. 9.81 for 10ml

6.8 ANTISHISTOSOMAL DRUGS

6.8.1 PRAZIQUANTEL

Route/Prep/Dose : 40mg/kg as a single dose; 60mg/kg in 3 divided doses in one day for *S. Japanicum*.

S.E./Brand/Cost : Biltricide. See literature

7. ANTI-NEOPLASTIC DRUGS

Only certain tumours are highly sensitive to chemotherapy. Great care should be taken not to damage normal cells as selectivity of action on cancer cells alone is not specific. Cytotoxic drugs may be used either singly or in combination therapy. Drug combinations are frequently more toxic than single drugs but has the advantage of enhanced response and increased survival.

Most cytotoxic drugs are teratogenic and all may cause life threatening toxicity. Administration should, where possible, be confined to those experienced in their use.

Almost all of them produce similar side effects. **Extra vasation of intravenous drugs** can cause severe local tissue necrosis as they are irritants.

Nausea and vomiting of varying extent occur with many of them. Severe emesis is unlikely with alkylating agents, I.V. flourouracil, vinca alkaloids or methotrexate. Antihistamines such as promethazine is sufficient to treat this. Moderate emesis occurs with cyclophosphamide and doxorubicin. Premedication with lorazepam or diazepam and dexamethasone will clear the situation.

Severe emesis is seen with mustine, dacarbazine and cisplatin. They are also best treated with dexamethasone and lorazepam given before and 6 hours after chemotherapy.

Bone marrow depression: All compounds except vincristine and bleomycin cause marrow depression. Peripheral blood counts must be checked prior to each treatment and doses should be reduced or therapy delayed if marrow recovery has not occurred.

Alopecia: Reversible hair loss is a common complication and varies from patient to patient with drugs. Cyclophosphamide is known to produce this.

Urothelial toxicity is a problem with cyclophosphamide.

ANTINEOPLASTIC & IMMUNOSUPPRESSIVE DRUGS

R H P

(Consult literature for details)

7.1 IMMUNOSUPPRESSIVE

7.1.1 AZATHIOPRINE

Preparation : Tab: 25mg; 50mg

Brand/Cost

IMURAN : Tab: 50mg: Rs. 381.79 for 100
(B.W.)

7.2 CYTOTOXIC DRUGS

7.2.1 ALKYLATING AGENTS

7.2.1.1 CYCLOPHOSPHAMIDE

Route/Preparation : Tab: 10mg, 50mg
Powder for Inj: 500mg in vial

Brand/Cost

ENDOXAN-ASTA : Tab: 10mg: Rs. 8.15 for 10
(Khandelwal)

7.2.1.2 CHLORAMBUCIL

Preparation : Tab: 2mg

Brand/Cost

LEUKERAN : Tab: 2mg: Rs. 26.37 for 100
(Burroughs 5mg: Rs. 60.45 for 100
Wellcome) :

7.2.1.3 BUSULPHAN

Preparation : Tab: 2mg

Brand/Cost

MYELERAN : Tab: 0.5mg: Rs. 6.07 for 100
(Burroughs 2mg: Rs. 14.25 for 100
Wellcome)

7.2.2 CYTOTOXIC ANTIBIOTICS**7.2.2.1 DOXORUBICIN**

Route/Prep/Dose : Powder for Injection 10mg in vial

Brand

ADRIAMYCIN

ADRIABLASTINA : Vial 10mg: Rs. 162.26 per vial
(Walter Bushnell)

7.2.2.2 MITOMYCIN

Route/Prep/Dose : Powder for injection: 2mg, 10mg, in vial.

Brand

MITOMYCIN-C : Vial: 2mg: Rs. 42.65 per vial
KYOWA (Biochem) 10mg: Rs. 197.40 per vial

7.2.2.3 BLEOMYCIN

Route/Prep/Dose : Powder for injection

Brand

BLEOCIN : amp: 15mg: Rs. 305.00
(Khandelwal)

7.2.2.4 ACTINOMYCIN-D

Route/Prep/Dose : Inj: 2mg vial; 10mg vial.

7.2.3 ANTIMETABOLITES**7.2.3.1 METHOTREXATE**

Route/Prep/Dose : Tab: 10mg and injection

Brand

NEOTREXATE : amp: 50mg: Rs. 36.50 per 2ml amp.
(Biddle Sawyer) Tab: 2.5mg: Rs. 6.70 per 10

7.2.3.2 MERCAPTOPURINE

Route/Prep/Dose : Tab: 50mg

Brand/Cost

PURI-NETHOL : Tab: 50mg: Rs. 22.98 for 25
(Burroughs
Wellcome)

7.2.3.3 FLUOURACIL

Route/Prep. : Caps: 250 mg.
Inj : 25 mg

Brand/Cost

FLURACIL : Cap : 250 mg: Rs. 37.20 for 10
(Biochem)
500mg per ml, 10ml amp: Rs. 66.55

7.2.4 VINCA ALKALOIDS**7.2.4.1 VINBLASTINE**

Route/Prep/Dose : Powder for Injection: 10mg in vial

Brand/Cost

VINBLASTIN-
RICHTER : Inj: 10mg: Rs. 73.96
(Khandelwal)

7.2.4.2 VINCRISTINE

Route/Preparation : Powder for Inj: 1mg, 5mg in vial

Brand

VINCRISTIN : Inj: 1mg vial: Rs. 48.12
(Biochem)

7.2.5 OTHER CYTOTOXIC DRUGS

7.2.5.1 PROCARBAZINE

Route/Prep/Dose : Cap: 50mg

Brand/Cost

NATULAN

(Roche)

7.3 HORMONES AND ANTIHORMONES

7.3.1 DEXAMETHASONE

Route/Prep/Dose : Tab: 0.5mg
Inj : 4mg/ml

Brand/Cost

DECADRON

(Merind)

: Tab: 0.5mg: Rs. 2.28 per 10
Inj : 4mg: Rs. 9.12 per 2ml vial

7.3.2 FOSFESTROL

Route/Prep/Dose : Tab : 100mg
Inj : 55.2mg/ml
Dose: 100–200mg three times daily, reduce to
100–300 daily.

Brand/Cost

HONVAN

(Khandelwal–Asta)

: Inj : 250mg/5ml amp: Rs. 6.49 per amp.
Tab: 100mg: Rs. 39.52 for 20

7.3.3 MEDROXYPROGESTERONE ACETATE

Route/Prep/Dose : Tab: 100mg

Brand/Cost

FARLUTAL

(Walter Bushnell)

: Tab: 10mg: Rs. 28.12 for 10
100mg: Rs. 140.00 for 10

7.3.4. PREDNISOLONE

Route/Prep/Dose : Tab: 5mg

Brand/Cost

DELTACORTIL

(Wymesone)

7.3.5 TAMOXIFEN

Route/Prep/Dose : Tab: 10mg, 20mg

Brand/Cost

TAMOFEN : Tab: 10mg: Rs. 240.00 for 100

(T.N. Dadha)

8. BLOOD — DRUGS AFFECTING

8.1 ANAEMIAS

Before initiating treatment it is essential to determine which type of anaemia is present.

Iron-deficiency anaemias: The only justification for iron treatment is the presence of a demonstrable iron-deficiency state. Prophylaxis is justifiable in pregnancy, menorrhagia, after subtotal or total gastrectomy, and in the management of low birth-weight infants such as premature babies, twins, and infants delivered by Caesarean section. Iron salts should be given by mouth unless there are good reasons for using another route.

Ferric salts are much less well absorbed and ferrous salts are preferred. Haemoglobin regeneration rate is little affected by the type of salt used provided sufficient iron is given. Choice of preparation is thus usually decided by incidence of side-effects and cost. The incidence of side effects due to ferrous sulphate is no greater than with other iron salts and is the cheapest. Treatment should be continued in cases of anaemia for a further three months in an attempt to replenish the iron stores. The therapeutic advantages of compound preparations are minimal and cost may be increased. There is neither theoretical nor clinical justification for the inclusion of other therapeutically active ingredients, such as the B group of vitamins (except folic acid for pregnant women).

8.1 ANTIANAEMIA DRUGS

8.1.1 FERROUS SULPHATE DI

Indication : Iron deficiency anaemia

Route/Prep/Dose : Tab : 200mg

Dose: Therapeutic: 120–180mg daily in divided doses.

Prophylactic: 60mg daily

Children: therapeutic: 6mg/kg (elemental iron)

S.E. : Large doses cause gastro-intestinal irritation; vomiting; diarrhoea; constipation may occur with continued administration.

Brand/Cost

FERROUS
SULPHATE : Rs. 16.00 for 1000 tabs.
(Cyper Pharma)

8.1.2 FERROUS SALT + FOLIC ACID DI

Indication : Prophylaxis in pregnancy

Route/Prep/Dose : Tablets
Ferrous sulphate (dried): 200mg; 67mg
Folic acid: 0.5mg; 0.1mg

S.E. : As for Ferrous sulphate

Brand/Cost

FEFOL : Tabs: large: Ferrous sulphate: 200mg
Folic acid: 0.5mg: Rs. 30.00 for 1000
(Cooper Pharma)
Tabs: small: Ferrous Sulphate: 67mg
Folic acid: 0.5mg: Rs. 20.00 for 1000

8.1.3 FOLIC ACID

Indication : Anaemia of pregnancy

Route/Prep/Dose : Tab: 5mg
Initially 15mg daily
Maintenance 5-10mg daily.

S.P. : Not to be given alone in Addisonism
Pernicious anaemia and other Vit B₁₂ deficiency states.

Caution in patients with folate dependent tumours and epileptics (lowers plasma concentration of phenytoin).

Brand/Cost

FOLIC ACID : Tab: 5mg: Rs. 30.00 for 1000
(Cooper Pharma)

FOLVITE : Tab: 5mg: Rs. 0.81 for 10
(Lederle) Inj : 15mg per ml: Rs. 3.59 for 10ml vial

8.1.4 HYDROXOCOBALAMIN (Vit B₁₂)

Indication : Anaemias of pregnancy; Megaloblastic anaemias
Addisonism; pernicious anaemia; Subacute
combined degeneration.

Route/Prep/Dose : Inj : 500 microgram/ml; 1mg/ml
Dose: 1mg, I.M.;
inj. repeated 5 times at interval of 2-3
days. Maintenance dose: 1mg every 3
months. Child: dosage as per adult.

Brand/Cost

MACRABIN : Inj: 500 microgram: Rs. 5.80 per 5ml
(Glaxo) 1mg. Rs. 7.60 per 5 ml.

8.1.5 IRON DEXTRAN R

Indication : Iron deficiency anaemia, when oral treatment has
failed.

Route/Prep/Dose : Inj: 2ml ampoule
I.V. infusion — 20ml amp.

S.E. : Rarely severe anaphylaxis. Transient nausea,
vomiting. Occasionally severe dyspnoea.

S.P. : Test dose essential

C.I. : Acute Renal failure. Severe liver disease.
I.V. infusion in asthmatics

Brand/Cost

IMFERON : Inj: 50mg/ml: Rs. 9.94 for 10ml vial.
(Ralli-Fison)

8.1.6 IRON SORBITOL H R

Indication : Iron deficiency anaemia

Route/Prep/Dose : IM Inj. 2ml ampoule

C.I. : Liver disease.
Pyelonephritis
Untreated U.T.I.

S.P. : Oral administration of iron should be stopped
atleast 24 hours before giving iron sorbitol
injection.

Brand/Cost

JECTOFER : Inj: 50mg/ml: Rs. 4.03 for 1.5ml.
(CFL-Pharma)

8.1.7 IRON LIQUID PREPARATION

FERRIC AMMONIUM CITRATE MIXTURE

	Children
Ferric ammonium citrate	80mg
Chloroform spirit	0.5ml
Orange syrup	1.0ml
Water	10 ml

Contains approximately 15mg elemental iron in 10ml.
Adults can take 20ml.

8.2. ANTICOAGULANTS

The main use of anticoagulants is to prevent thrombus formation or the extension of an existing thrombus and are therefore widely used in the

prevention and treatment of deep-vein thrombosis in the legs. Anticoagulants are of less use in preventing thrombus formation in arteries and to prevent thrombi forming on prosthetic heart valves.

HEPARIN given parenterally is rapidly effective. As its effects are short-lived it is best given by continuous infusion; if given by intermittent intravenous injection, the interval between doses must not exceed 6 hours. Oral anticoagulants are started at the same time, and the heparin infusion withdrawn after 3 days.

If oral anticoagulants cannot be given and heparin is continued, its dose is adjusted after determination of the activated partial thromboplastin time.

If haemorrhage occurs it is usually sufficient to withdraw heparin, but if rapid reversal of the effects of heparin is required protamine sulphate is a specific antidote.

Oral anticoagulants antagonise the effects of vitamin K, and take at least 36 to 48 hours for the effect to develop. If an immediate effect is required, heparin must be given concomitantly.

The main indication for oral anticoagulant therapy is deep-vein thrombosis, in patients with heart valve prostheses, to prevent emboli developing on the valves. Antiplatelet drugs may also be useful in these patients.

8.2.1 HEPARIN DI

Indication	: Deep vein thrombosis; disseminated intravascular coagulation, prevention of post-operative thrombosis. Thromboembolic conditions.
Route/Prep/Dose	: IV or SC inj. 1000 IU/5ml vial 5000 IU/5ml vial
S.P.	: Pregnancy
C.I.	: Haemophilia and other haemorrhagic disorders; peptic ulcer; severe hypertension; severe liver

disease; recent surgery of eye or nervous system.
Hypersensitivity to heparin.

Brand/Cost

HEPARIN : Inj: 1000 IV: Rs. 9.00 for 5ml vial
(Biological Evans) 5000 IV: Rs. Rs. 35.00 for 5ml vial

Antidote : Protamine Sulphate 1½ — 5ml ampoule by slow
I.V. injection. 1mg neutralises 100 units Heparin.

8.2.2 WARFARIN SODIUM D I H A P

Indication : Deep vein thrombosis; transient ischaemic
attacks; prophylaxis with prosthetic valves.

Route/Prep/Dose : Tab : 5mg
Dose: to be adjusted by regular check on
Prothrombin time.

S.E. : Haemorrhage

C.I. : Pregnancy; peptic ulcer; severe hypertension;
bacterial endocarditis.

S.P. : Hepatic or renal disease; recent surgery.

Brand/Cost

UNIWARFIN : Tab: 5mg: Rs. 1.89 for 25
(Unichem)

Antidote : Vit. K

8.3 ANTIPLATELET

8.3.1. ASPIRIN D I P

Indication : Thromboembolic disorders; transient ischaemic
attacks; unstable angina.

Route/Prep/Dose : Tab : 300mg
Dose: 150mg OD

S.E./C.I./Brand/
Cost : (See 3.1.1.)

8.3.2 DIPYRIDAMOLE

Indication : Post myocardial infarction; prophylaxis in ischaemic heart disease; transient ischaemic attacks; peripheral vascular disease.

Route/Prep/Dose : Tab: 25mg, 100mg. Dose for inhibition of platelet aggregation: 300–400mg/day
Other conditions: 25mg TID

S.E. : Nausea, diarrhoea, hypotension; throbbing headache.

S.P. : May exacerbate migraine; hypotension

Brand/Cost

PERSANTIN : Tab: 25mg: Rs. 18.34 for 100
(German Remedies) 100mg: Rs. 19.40 for 30

DEPLATOL : Tab: 25mg: Rs. 2.30 for 10
(Martel Hammer) 100mg: Rs. 7.21 for 10

8.4 FIBRINOLYTIC DRUGS

8.4.1 STREPTOKINASE P

Indication : Deep vein thrombosis; pulmonary embolism; myocardial infarction; arterial thromboembolism.

Route/Prep/Dose : By I.V. infusion 250,000–600,000 units every hour up to 48–72 hours. 750,000 units over ½ hour in myocardial infarction.

S.E. : Allergic reactions; fever; rashes; haemorrhage.

S.P. : Atrial fibrillation; recovering from streptococcal infections.

C.I. : Recent haemorrhage; severe hypertension; menstruation; pregnancy; streptococcal infections.

Brand/Cost

KABIKINASE : 250,000 IU: Rs. 465.30
(Kabi Vitrum) : 750,000 IU: Rs. 929.70
1,500,000 IU: Rs. 1653.30

8.5 HAEMOSTATICS

8.5.1 CALCIUM GLUCONATE

Indication : Often used as an adjunct with other haemostatics but may not be useful. Repeated blood transfusions. Hypocalcaemic states.

Route/Prep/Dose : Slow I.V.
Inj: 10% solution
10ml ampoule.

S.P. : Extravasation may cause local sloughing.

Brand/Cost

CALCIUM : Inj: 137.5mg/ml,
(Sandoz) 5ml amp: Rs. 12.09 for 10
10ml amp: Rs. 7.23 for 5

8.5.2 EPSILON AMINOCAPROIC ACID

Indication : Control of haemorrhage in obstetrics; to reduce bleeding in post prostatectomy and tonsillectomy; mouth bleeding in haemophilia.

Route/Prep/Dose : Inj : 250mg/ml – 20ml vial
Tab : 500mg
Dose: I.V. 5g stat followed by 1g hourly till response obtained.
Children: 100mg/kg I.V. and maintained by 33mg/kg.

Brand/Cost

AMICAR : Inj: 250mg per 20ml:
(Cynamid) Rs. 24.55 per 20ml vial

8.5.3 VITAMIN K

Indication : Hypoprothrombinaemia in hepatocellular disease or obstructive jaundice following oral anticoagulants treatment. Prophylactic in newborns and bleeding in neonates.

Route/Prep/Dose : Inj : 100mg/ml – 1ml amp
Tab : 10mg
Dose: 10mg/day in adults. Newborns 1mg, IM.

S.P. : Can aggravate jaundice in newborn.
Large doses produce haemolytic anaemia, hyperbilirubinaemia and kernicterus in newborn.

Brand/Cost

KAPLIN : Inj : 100mg/ml: Rs. 9.00 for 6 amp.
(Allenbury's) Tab : 10mg: Rs. 8.24 for 100

9. BLOOD PRODUCTS & BLOOD SUBSTITUTES

9.1 PLASMA SUBSTITUTE

9.1.1 DEXTRAN

Indication	:	Short term blood volume expansion (Dextran 70); prophylaxis of post surgical thromboembolic disease (Dextran 40)
Route/Prep/Dose	:	I.V. infusion: 500ml bottle Dextran 70 Dextran 40 in dextrose or saline.
S.E.	:	Rarely anaphylactoid reactions
C.I.	:	Severe congestive cardiac failure; renal failure; bleeding disorders, eg., thrombocytopenia.
S.P.	:	Blood sample for cross matching should ideally be taken before infusion.
Brand/Cost		
LOMODEX (Rallis-Fison)	:	10% in normal saline: Rs. 57.58 per 540ml 10% in 5% dextrose Rs. 57.58 per 540ml
LOMODEX 70 (Rallis-Fison)	:	6% in normal saline: Rs. 46.76 per 540ml 6% in 5% dextrose: Rs. 46.76 per 540ml

9.1.2 GELATIN

Indication	:	Blood volume expansion
Route/Prep/Dose	:	I.V. infusion: 500ml
S.E.	:	Hypersensitivity reaction
S.P./C.I.	:	Do not use solution if not clear. Cardiac failure. Hypersensitivity reaction

01882
PR400

Brand/Cost

HAEMACCEL : Rs. 59.7 for 500ml
(Hoechst)

9.2 PLASMA FRACTIONS FOR SPECIFIC USES

9.2.1 ALBUMIN, HUMAN SERUM : See Literature

9.2.2 FIBRINOGEN (Human) : See Literature

10. CARDIOVASCULAR DRUGS

10.1 ANTI-ANGINA DRUGS

Most patients with angina pectoris are treated with betablockers or calcium channel blockers. However, short acting nitrates retain an important role both for prophylactic use before exertion and for chest pain occurring at rest. Nitrates are sometimes used as sole therapy, especially in elderly patients with frequent symptoms.

By reducing cardiac work, Beta-blockers improve exercise tolerance and relieve symptoms in patients with angina. No one drug has been proven to be superior to another, although a patient may occasionally respond better to a specific beta blocker. There is some evidence that sudden withdrawal may cause an exacerbation of angina. Therefore, gradual reduction of dose is preferable when beta blockers are to be stopped. They should not be used in patients with incipient cardiac failure, second or third degree heart block, asthma, and in diabetics with frequent episodes of hypoglycemia. Beta blockers used in angina are — propranolol, atenolol, metoprolol, acebutolol, nadolol, pindolol and oxprenolol — of these atenolol and metoprolol are preferred because of their cardioselective action.

Verapamil, nifedipine and diltiazem are calcium channel blockers available for use in angina. They reduce myocardial contractivity and coronary and systemic vascular tone. Verapamil may precipitate heart failure, exacerbate conduction disorders and cause hypotension at high doses. It should be used with caution when combined with beta blockers. Nifedipine has less effects on the myocardium and rarely precipitates heart failure. Minor side effects associated with vasodilatation such as flushing, head ache and ankle swelling are common. Verapamil and nifedipine are valuable in forms of angina associated with unusual coronary constriction. Diltiazem is effective in most forms of angina, and can be used in those patients for whom beta blockers are contraindicated or ineffective.

Sublingual glyceryl trinitrate is one of the most effective drugs for providing rapid angina relief but its effect lasts only 20 to 30 minutes. Its principal benefit follows from a reduction in venous return which reduces left ventricular work. Side effects include head ache, flushing and postural hypotension. The percutaneous preparations may be useful in the prophylaxis of nocturnal or rest angina. Isosorbide dinitrate is effective sub-lingually and orally. The effect is slower in onset but longer lasting. Injectable forms of nitrates may be tried when the sublingual form is ineffective in patients with chest pain due to myocardial infarction or severe ischaemia.

10.1 ANTIANGINAL

10.1.1 GLYCERYL TRINITRATE

Indication	: Prophylaxis and treatment of angina; left ventricular failure
Route/Prep/Dose	: Sublingual tab: 0.5mg Dose: 0.5mg — 1mg sublingual; repeated as required.
S.E.	: Throbbing headache; flushing; dizziness; postural hypotension; tachycardia.
S.P.	: Hypotensive conditions To be used in 8 weeks once the bottle is opened; dispense in glass containers.

Brand/Cost

ANGISED (Burroughs Wellcome)	: Tab: 0.5mg: Rs. 1.18 for 10
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10.1.2 ISOSORBIDE DINITRATE DI

Indication	: Prophylaxis and treatment of angina; left ventricular failure.
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Route/Prep/Dose : Tab : 5mg, 10mg,
 Cap : 20mg
 Dose: 5mg sublingual, PRN
 Oral : 10-30 — QID
 In left ventricular failure, 40-160mg — up to
 240mg/day if required

S.E. : Throbbing headache; flushing; dizziness; postural
 hypotension; tachycardia.

S.P. : Hypotensive conditions

Brand/Cost

ISORDIL : Tab: 10mg: Rs. 9.38 per 100
 (Geoffrey Manners) Sublingual Tab: 5mg: Rs. 4.96 for 100

SORBITRATE : Tab: 10mg: Rs.9.43 for 100
 (Nicholas)

CARDICAP T.R. : Tab: 10mg: Rs. 5.75 for 50
 (Natco)

10.1.3 NIFEDIPINE DI

Indication : Prophylaxis and treatment of anginas;
 hypertension; Raynaud's phenomenon.

Route/Prep/Dose : Cap : 10mg: Tab: 10mg
 Cap : 20mg (Retard)
 Dose: 10-20mg every 6 hours.
 For immediate effect bite into capsule and retain
 liquid in mouth.

S.E. : Headache; flushing; lethargy; peripheral oedema;
 gum hyperplasia.

S.P. : Withdraw if ischaemic pain occurs or existing
 pain worsens shortly after initiating treatment.
 May inhibit labour.

Brand/Cost

NIFEDIPINE : Tab: 5mg: Rs. 80 for 1000
(CMS-I) 10mg: Rs. 97.00 for 1000

NICARDIA : Cap : 5mg: Rs. 8.69 for 30
(Unique Chem) 10 mg: Rs. 4.95 for 10
Tab : 10mg: Rs. 6.30 for 10

10.1.4 OXYFEDRINE P

Indication : Treatment of angina

Route/Prep/Dose : Tab : 8mg
Dose: 16mg TID initially and
maintenance 8mg TID.

C.I. : Aortic incompetence with severe
haemodynaemic disturbance and subvalvular
aortic stenosis.

S.P. : Pregnancy

Brand/Cost

ILDAMEN : Tab: 8mg: Rs. 7.70 for 100
(German Remedies) 24mg: Rs. 51.72 for 30

10.1.5 PROPRANALOL D I P H R

Indication : Angina; hypertension; arrhythmia; secondary
prevention after acute myocardial infarction;
migraine prophylaxis; thyrotoxicosis.

Route/Prep/Dose : Tab : 100mg, 40mg
Inj : 1mg/ml ampoule
Dose: Angina; 40mg 2-3 times daily
(maintenance: 120-250mg daily)
Hypertension: 40-80mg BD and at weekly
intervals (maintenance: 160-320mg daily).
Arrhythmias: 10-40mg, 3-4 times daily.

Prophylaxis after myocardial infarction:
40mg QID for 2-3 days; then 80mg BD
beginning 5-21 days after infarction.
Migraine prophylaxis: 40mg 2-3 times/day.
I.V. 1mg over 1 minute preceded by
atropine sulphate; if necessary repeat at 2
min. interval. Max 15mg.

S.E. : Bradycardia; heart failure; bronchospasm;
peripheral vasoconstriction; gastro-intestinal
disturbance.

S.P. : Late pregnancy; breast feeding. Avoid abrupt
withdrawal in ischaemic heart disease. Reduce
oral dose in liver disease and in renal impairment.

Brand/Cost

PROPRANOLOL : Tab: 10mg: Rs. 80.00 for 1000
(CMS-I) 40mg: Rs. 130.00 for 1000

INDERAL : Tab: 10mg: Rs. 1.42 for 10
(IEL) 40mg: Rs. 4.12 for 10
80mg: Rs. 6.50 for 10

10.1.6 METAPROLOL : See 10.3.9

10.1.7 ATENOLOL : See 10.3.7

10.1.8 VERAPAMIL DI

Indication : Angina; hypertension;
supra ventricular arrhythmias.

Route/Prep/Dose : Dragees 40mg
Inj : 5mg/2ml amps.
Dose: 40-80mg TID

S.E. : Nausea; vomiting; constipation; headache.
Rarely reversible impairment of liver function.

After I.V. — Hypotension; bradycardia; heart block and asystole.

- S.I. : 1st degree heart block.
I.V. in patients taking beta blockers. Reduce dose in hepatic impairment.
- C.I. : 2nd and 3rd degree heart blocks; sick sinus syndrome; heart failure; atrial flutter or fibrillation complicating Wolff-Parkinson-White syndrome.

Brand/Cost

ISOPTIN : Inj : 5mg: 2ml amp: Rs. 5.46 for 5 amps
(Boehringer Knoll) Dragees: 40mg: Rs. 18.24 for 30 dragees
80mg: Rs. 14.30 for 12 dragees

10.1.9 DILTIAZEM HCl D I P L H R

- Indication : Prophylaxis and treatment of angina
- Route/Prep/Dose : Tab : 60mg, 30mg
Dose: 30mg QID before meals and at bed time.
Max. dose: 240mg/day. Not recommended for children.
- C.I. : Sick sinus syndrome; 2nd or 3rd degree heart block; severe congestive cardiac failure.
- S.P. : Pregnancy; lactation; hypotension; impaired hepatic or renal function. Avoid abrupt withdrawal. Concomitant use with beta blocker.

Brand/Cost

DILZEM : Tab: 30mg: Rs. 12.00 for 10
(Torrent) 60mg: Rs. 23.00 for 10

DILGINA : Tab: 30mg: Rs. 11.50 for 10
(Kopran) 60mg: Rs. 21.00 for 10

10.2.1 ATROPINE

- Indication : Sinus bradycardia; symptomatic bradycardia
- Route/Prep/Dose : See Atropine

10.2.2. DISOPYRAMIDE

- Indication : Ventricular arrhythmias esp; after myocardial infarction; supraventricular arrhythmias; arrhythmia associated with Wolff-Parkinson-White syndrome.
- Route/Prep/Dose : Cap : 100mg
Dose: 100mg Q. 6.H.
(300-800mg daily in divided doses)
- S.E. : Myocardial depression; hypotension; A.V. block; anticholinergic effects; dry mouth; blurred vision; urinary retention.
- S.P. : Glaucoma; heart failure; prostatic enlargement.
Reduce dose in renal impairment.

Brand/Cost

- NORPACE : Cap : 100mg: Rs. 16.63 for 10
(Searle) 150mg: Rs. 24.07 for 10

10.2.3 ISOPRENALINE SULPHATE

- Indication : Heart block; severe bradycardia
- Route/Prep/Dose : Inj : 2mg/ml in 2ml amp.
Dose: 1 amp (4mg) given by infusion in 500ml normal saline or dextrose saline.
- S.E. : Tachycardia; arrhythmia; hypotension; sweating; tremor; headache.
- S.P. : Ischaemic heart disease; diabetes mellitus; hyperthyroidism

Brand/Cost

ISOPRIN : Inj: 2mg/ml, 2ml amp: Rs. 7.88 for 10 amp.
(Unichem)

10.2.4 PHENYTOIN DI P H: See 11.4.5

Indication : Cardiac arrhythmias

Route/Prep/Dose : Inj: 50mg/ml — 2ml amp.
Dose: 5mg/kg I.V. very slowly not exceeding 50mg/min.
Oral : Tab: 1000mg 1st day; 50 mg 2nd to 4th day; thereafter 4–6mg/kg/day.

S.E. : Hypotension

Brand/Cost

EPTOIN : Tab: 100mg: Rs. 12.67 for 100
(Boots)

EPSOLIN : Inj : 50mg/ml, 2ml amp: Rs. 6.62 for 5 amps.
(Cadila) Tab : 100mg: Rs. 18.00 for 100

DILANTIN : Cap : 100mg: Rs. 24.41 for 100
(P.D. & Co) Suspension: 100mg/4ml: Rs. 9.00 for 114ml.

10.2.5 LIGNOCAINE HCl (LIDOCAINE HCl) H

Indication : Ventricular arrhythmias esp., after myocardial infarction.

Route/Prep/Dose : Inj : 20mg/ml – 5ml
2% inj: 50ml vial
Dose: I.V. 50–100mg as bolus; repeated after 10–15 min & start on infusion at 1–2mg/min.

S.E. : Confusion; convulsion

S.P. : Lower dose in congestive cardiac failure, hepatic failure and following cardiac surgery.

C.I. : Sinoatrial disorders; all grades of A.V. block; severe myocardial depression.

Brand/Cost

XYLOCARD : Inj: 21.3mg/ml, 5ml amp: Rs. 9.90 for 5 amp.
(Astra)

GESICARD : Inj: 20mg amp: Rs. 26.76 for 25 amp.
(SG Pharma) Rs. 4.73 for 50ml.

11.2.6 MEXILETINE HCl

Indication : Ventricular arrhythmias, esp., after myocardial infarction.

Route/Prep/Dose : Cap : 50mg, 150mg
Inj : 25mg/ml amp. of 10ml each
Dose: Oral: 200mg 3-4 times/day
Inj : 100-250mg I.V. at a rate of 25mg/min. followed by infusion of 250mg as a 0.1% solution over 1hr; 125mg/hr for 2 hours and then 500 microgram/min. dose to be titrated to patient's response.

S.E. : Bradycardia; hypotension; confusion; nystagmus; tremors.

C.I. : Bradycardia; heart block.

Brand/Cost

MEXETIL : Caps: 50mg: Rs. 24.20 for 10
(German Remedies) 150mg: Rs. 67.10 for 10
Inj : 10ml: Rs. 75.20 for 5 amps.

10.2.7 PROPRANALOL : See 10.1.5

10.2.8 PROCAINAMIDE R

- Indication : Ventricular arrhythmia esp., after myocardial infarction; supraventricular arrhythmia.
- Route/Prep/Dose : Tab : 250mg
Inj : 100mg/ml — 10ml vial
Dose: Adult: 1g initially followed by total daily dose of 50mg/kg at 3 hr intervals.
I.V. (slow): 25–30mg/min. with ECG monitoring, max: 1g.
- S.E. : Nausea; diarrhoea; rashes; fever; myocardial depression; heart failure; lupus erythematosis like syndrome; agranulocytosis after prolonged treatment.
- S.P. : Renal disease; asthma; myasthenia gravis.
- C.I. : Heart block; heart failure; hypotension.
- Brand/Cost**
PRONESTYL : Inj : 100mg/ml: Rs. 21.65 per 10ml vial
(Sarabhai) Tab : 0.25g: Rs. 10.85 for 25

10.2.9 QUINIDINE SULPHATE

- Indication : Prevention of supraventricular tachycardias; ventricular arrhythmias.
- Route/Prep/Dose : Tab : 200mg
Inj : 115mg/ml amp.
Dose: Adult: 200mg Q4h
Child: Test dose 2mg/kg
Therapeutic dose: 30mg/kg/day
- S.E. : As under Procainamide. Thrombocytopaenia; haemolytic anaemia; rarely granulomatous hepatitis.

C.I. : Heart block

Brand/Cost

QUINIDINE

SULPHATE

(Burroughs

Wellcome)

: Tab: 200mg: Rs. 19.39 for 25

10.2.10 VERAPAMIL: See 10.1.8

10.3 ANTI-HYPERTENSIVE DRUGS

Patients whose average diastolic B.P. exceed 100mm Hg should receive anti-hypertensive therapy. Below this level, the benefits of therapy are unproven. The aim of therapy is to reduce diastolic BP to below 100mm Hg.

“Step-care” therapy is probably still the best anti-hypertensive strategy. The first step is non-drug treatment wherein the patient is advised to cut down on salt and alcohol intake and attain his ideal weight.

Step two involves the use of any thiazide diuretic e.g., hydrochlorothiazide, in the lowest possible dose. Potassium supplements and potassium sparing diuretics (triamterene or amiloride — in the absence of hypokalemia) are usually not needed.

Beta blockers, e.g., atenolol, metoprolol can then be used in combination with a thiazide diuretic when they are not effective alone. Calcium channel blockers (nifedipine, verapamil) are considered when thiazides and beta-blockers are contraindicated, are not tolerated or fail to control BP. Nifedipine acts primarily as an arteriolar vasodilator and can be combined with a beta-blocker while verapamil by virtue of its negative inotropic and chronotropic effects should never be combined with a beta blocker.

Captopril (an angiotensin converting enzyme inhibitor) is a potent vasodilator though side effects such as proteinuria, rashes and leucopenia are encountered at high dose. Enalapril is a newer ACE

inhibitor not yet proven to be superior to captopril. Both drugs can produce a precipitous drop in BP in patients with renal impairment and/or receiving diuretic therapy, and should therefore be given in low initial doses.

Vasodilators such as, hydralazine, can be added to a regimen of thiazide and beta blocker. Diazoxide is diabetogenic and is used only in hypertensive emergencies when it can be given intravenously. Sodium nitroprusside I.V. is also very useful in a hypertensive crisis. Minoxidil, a highly potent drug, should be reserved for the treatment of severe hypertension, always combining it with a beta blocker and a diuretic since patients develop fluid retention. Hypertrichosis is troublesome and renders minoxidil unsuitable for women.

Centrally acting hypertensives such as methyldopa, clonidine and reserpine have declined in their popularity. Methyldopa, however, has the advantage of being safe in asthmatics, heart failure and pregnancy. Side effects such as depression, sedation, impotence and liver damage can be minimised by keeping the daily dose below 1 g. Clonidine has the disadvantage of withdrawal resulting in hypertensive crisis. Reserpine can cause sedation, nasal congestion, postural hypotension and depression but if in low doses and at night, is useful in mild hypertension.

10.3.1 CLONIDINE HCl DI

Indication	: Hypertension; migraine
Route/Prep/Dose	: Tab : 100 microgram; 150 microgram Dose: Start with ½ to 1 tab/day and increase by ½ tab every 2 days till desired effect is achieved.
S.E.	: Dry mouth, sedation; depression; fluid retention; bradycardia; Raynaud's phenomenon.
C.I.	: History of depression.

S.P. : Must be withdrawn gradually to avoid hypertensive crisis.

Brand/Cost

CATAPRES : Tab: 150 microgram: Rs. 15.00 for 100
(German Remedies)

ARKAMIN : Tab: 100 microgram: Rs. 4.24 for 10
(Unichem)

10.3.2 HYDRALAZINE

Indication : Moderate to severe hypertension; in addition to a beta blocking drug or diuretic; hypertensive crisis.

Route/Prep/Dose : Tab : 25mg
Dose: 25mg BD, increment to max 50mg BD.

S.E. : Trachycardia; fluid retention; nausea; vomiting;
SLE like syndrome after long term treatment with doses over 100mg/day (or less in women)

S.P. : Reduce dose in renal impairment. Over rapid reduction in blood pressure is seen occasionally even with low parenteral doses.

Brand/Cost

NEPRESOL : Tab: 25mg: Rs. 9.07 for 100
(Ciba)

10.3.3 HYDROCHLOROTHIAZIDE DI

Indication : Oedema; hypertension

Route/Prep/Dose : Tab: 50mg

S.E. : Rashes; thrombocytopaenia; impotence
(reversible on withdrawal of treatment)

Brand/Cost

ESIDREX : Tab: 50mg: Rs. 6.31 for 100
(Ciba Hindustan)

10.3.4 LABETALOL HCl DI

- Indication : Hypertension (including hypertension in pregnancy), hypertension with angina and hypertension following acute myocardial infarction, hypertensive crisis, controlled hypotension in surgery.
- Route/Prep/Dose : Tab : 50mg, 100mg & 200mg
Dose: Initially 50mg BD with food increased at intervals of 14 days; usually 200–400mg/day
- S.E. : Postural hypotension; tiredness; weakness; rashes; scalp tingling; difficulty in micturition; epigastric pain; nausea, vomiting; rarely lichenoid rash.
- C.I. : Cardiogenic shock; severe bradycardia; heart block
- S.P. : Asthma; breast feeding. Avoid abrupt withdrawal. Interferes with laboratory tests for catecholamines. Crosses placental barrier and may cause hypoglycaemia, hypotension and bradycardia in foetus.

Brand/Cost

NORMADATE : Tab: 50mg: Rs. 7.55 for 10
(Glindia) 100mg: Rs. 15.00 for 10
200mg: Rs. 29.04 for 10

10.3.5 ACEBUTOLOL

- Indication : Hypertension (Cardioselection)

Route/Prep/Dose : Tab : 200mg; 400mg
Inj : 5mg/ml. (2ml amp)

S.E./S.P. : as for other betablockers

Brand/Cost

SECTRAL : Tab : 200mg: Rs. 18.10 for 10
(M&B) Tab : 400mg: Rs. 35.00 for 10
Inj : 5mg/ml: Rs. 3.50 for 2ml amp

10.3.6 GUANETHIDINE R P

Indication : Hypertension

Route/Prep/Dose : Tab : 10mg, 25mg
Dose: 10mg daily may be increased by 10mg at weekly intervals up to max of 30mg.

S.E. : Postural hypotension; failure of ejaculation; fluid retention; nasal congestion; diarrhoea.

S.P. : Pregnancy

C.I. : Phaeochromocytoma
Renal failure

Brand/Cost

ISMELIN : Tab: 10mg: Rs. 15.00 for 100
(Hindustan Ciba)

10.3.7 ATENOLOL DI H R P L

Indication : Hypertension; angina; arrhythmias; early intervention in acute myocardial infarction

Route/Prep/Dose : Tab : 50mg, 100mg
Dose: 50-100mg daily as required

S.E. : As for PROPRANACOL

Brand/Cost

TENSIMIN : Tab : 50mg: Rs. 8.13 for 10
(Unique Chem) 100mg: 13.20 for 10
Inj : 500mg/ml Rs. 3.99 for 10ml amp.
Tab : 25mg: Rs. 5.32 for 10

BETACARD : Tab : 50mg: Rs. 11.90 for 14
(Torrent) 100mg: Rs. 16.50 for 10

10.3.8 METHYL DOPA H

Indication : Hypertension

Route/Prep/Dose : Tab : 250mg
Dose: 250mg 3 times daily Gradually increased.
Max dose: 3g/day
Child: 30–40mg/kg/day.

S.E. : Dry mouth, sedation, depression, drowsiness,
diarrhoea, fluid retention, failure of ejaculation,
haemolytic anaemia, SLE like syndrome, liver
damage.

S.P. : Positive direct coombs test in 20% of patients.
May affect blood cross matching.

C.I. : History of depression. Acute liver disease.
Pheochromocytoma.

Brand/Cost

ALDOMET : Tab : 250mg: Rs. 10.00 for 10
(Merind)

EMDOPA : Tab : 250mg: Rs. 15.29 for 10
(IDPL)

10.3.9 METAPROLOL P H R

Indication : Hypertension; angina; arrhythmia; early
intervention in acute myocardial infarction;

migraine prophylaxis; thyrotoxicosis.

Route/Prep/Dose : Tab : 50mg
Dose: Hypertension: 100mg daily, initially,
maintenance 100–400mg daily in 1–2
doses.
Angina: 50–100mg 2–3 times daily
Arrhythmias: 50mg 2–3 times daily
Migraine prophylaxis: 100–200mg daily in
divided doses.
Thyrotoxicosis: 50mg 4 times daily.

S.E./S.P./C.I. : As for Propranolol

Brand/Cost

METOLAR : Tab : 50mg: Rs. 7.78 for 10
(Cipla) 100mg: Rs. 13.34 for 10

BETALOC : Tab : 50mg: Rs. 8.95 for 10
(Astra-IDL) 100mg: Rs. 17.00 for 10

10.3.10 NIFEDIPINE : See 10.1.3

10.3.11 RESERPINE + HYDRALAZINE

Indication : Hypertension

Route/Prep/Dose : Tab : Reserpine 0.1mg
Hydralazine 10mg
Dose: 1 TID initially
Maintenance 1–2 per day

S.E. : Dry mouth; nasal congestion; sedation;
depression; postural hypertension; fluid
retention; bradycardia.

C.I. : History of depression; phaeochromocytoma;
peptic ulcer; Parkinson's disease

S.P. : Late pregnancy; lactation

Brand/Cost

ADELPHANE : Tab : Rs. 23.89 for 250
(Ciba Hindustan)

10.3.12 SODIUM NITROPRUSSIDE H R

Indication : Hypertensive crisis; controlled hypotension in surgery; acute or chronic heart failure.

Route/Prep/Dose : Tab : 50mg vials (to be reconstituted)
Dose: By I.V. infusion 0.3–1 microgram/kg/min. initially, then adjusted.
Usual range: 0.5–6 microgrames/kg/min.
Max. 8 microgram/kg/min.
Lower doses for patients already on treatment with antihypertensives.

S.E. : Headache; dizziness; nausea; retching; abdominal pain; perspiration; palpitation; apprehension; retrosternal discomfort —reduce infusion rate.

S.P. : Hypothyroidism; severe renal impairment; elderly; impaired cerebral circulation; monitor plasma cyanide concentration.

C.I. : Severe hepatic impairment; Vit B₁₂ deficiency; Leber's optic atrophy; compensatory hypertension.

Brand/Cost

SONIDE : Inj : 500mg/ml: Rs. 17.93 per vial
(Gufic)

10.3.13 CAPTOPRIL (ACE INHIBITOR) D I P R

Indication : Mild to moderate hypertension; as an adjunct to thiazide treatment. Severe hypertension, resistant to other treatment. Adjunctive treatment in congestive cardiac failure.

Route/Prep/Dose : Tab : 25mg
Dose: Mild to moderate hypertension; initially, 12.5mg BD. Usual maintenance: 25mg BD; Max. 50mg BD
Severe hypertension (with other antihypertensive) Max. 50mg TID.
Heart failure with a diuretic: initially 6.25–12.5mg under close medical supervision. Usual maintenance dose 25mg TID.

S.E. : Persistent dry mouth; loss of taste; stomatosis; abdominal pain; rash; angio-oedema; hypotension; proteinuria; agranulocytosis; neutropaenia; hyperkalaemia (esp., in renal impairment).

C.I. : Pregnancy.
Aortic stenosis.

S.P. : First dose may cause severe hypotension within 3 hours esp., in patients on diuretics, low sodium diet or dialysis. Reduce dose or avoid in renal impairment. Check WBC and urine protein before and during treatment (In patients with renal impairment or auto-immune disease)
Avoid concurrent treatment with allopurinol, procainamide (Neutropaenia, Stevens Johnson syndrome) and potassium sparing diuretics (danger of hyperkalaemia).

Brand/Cost

ACETEN : Tab : 25mg: Rs. 20.00 for 10
(Woekhardt)

ANGIOPRIL : Tab : 25mg: Rs. 18.50 for 10
(Torrent) 50mg: Rs.35.00 for 10

10.3.14 TRIAMTERENE + BENZTHIAZIDE R P

- Indication : Mild to moderate hypertension. Oedema.
- Route/Prep/Dose : Tab : Triamterene 50mg
Benzthiazide 25mg
Dose: Hypertension: 1 BD
Oedema — 2 after breakfast 1 after lunch
Maintenanced: 1 or 2 on alternate days.
- S.E. : Dry mouth; rashes; gastro-intestinal disturbance.
- S.P. : Pregnancy; diabetes mellitus; cirrhosis of liver.
Monitor plasma urea and potassium in elderly
and in renal impairment. Avoid potassium
supplements.
- C.I. : Hyperkalaemia
Renal failure.

Brand/Cost

- DYTIDE : Tab : Rs. 6.37 for 12
(SK&F)

10.4 CARDIAC GLYCOSIDES & ACE INHIBITERS

Cardiac glycosides are most useful in the treatment of supraventricular tachycardias. Except when needed to maintain satisfactory rhythm, cardiac glycosides can often be withdrawn from patients with heart failure that is well controlled, without clinical deterioration. Their use for heart failure alone is therefore best avoided in the elderly who are particularly susceptible to digitalis toxicity.

Loss of appetite, nausea, and vomiting and common toxic effects, Sinus bradycardia, atrioventricular block, ventricular extrasystoles, and sometimes ventricular tachycardia or atrial tachycardia with block also occur — especially in the presence of underlying conducting system defects or myocardial disease. Hypokalaemia predisposes to toxicity. Renal function is the most important determinant of digoxin dosage

Manifestations of toxicity can often be managed by discontinuing therapy and correcting hypokalaemia if appropriate.

10.4.1 DIGOXIN D I R

- Indication : Heart failure; supraventricular arrhythmias esp., atrial fibrillation.
- Route/Prep/Dose : Tab : 0.25mg
Inj : 0.5mg/2ml amp.
Elixir: 0.05mg/ml.
Dose: by mouth rapid digitalisation 1–1.5mg in divided doses (Q6h) over 24 hours.
Less urgent and maintenance:
0.0125mg–0.25mg BD. Elderly 0.0125mg OD I.V. digitalising dose of 0.15–1mg preferably as an infusion (vol 50ml) over 2 or more hours followed by normal maintenance therapy.
IM not recommended, except when other routes not available.
Child: 0.04mg/kg; half the dose stat and remainder in 2 doses at 8 hourly intervals till desired effect achieved. Maintenance 0.01mg/kg.
- S.E. : Anorexia; nausea; vomiting; visual disturbance; arrhythmias; heart block.
- S.P. : Recent infarction; hypothyroidism. Reduce dose in elderly and in renal impairment. Avoid hypokalaemia. Monitor electrolytes.
- C.I. : In the presence of A–V. block in the absence of pace maker. Great caution in patients with sick sinus syndrome, if a pacemaker is not present.

Brand/Cost

LANOXIN : Tab : 0.25mg: Rs. 0.97 for 10
 (Burroughs Inj : 0.5mg/2ml: Rs. 16.32 for 10 amp.
 Wellcome) Elixir : 0.05mg/ml: Rs. 2.69 for 30ml
 Paed inj: 0.05mg/ml: Rs. 8.93 for 10 amp.

CARDIOXIN : Tab : 0.25mg: Rs. 1.94 20
 (Sandoz)

10.4.2. CAPTOPRIL: See 10.3.13

10.4.3. ENALAPRIL D I P R L

Indication : as for captopril

Route/Prep/Dose : Tab : 5mg; 10mg

10.5 DRUGS USED IN SHOCK OR ANAPHYLAXIS**10.5.1 ADRENALINE DI (EPINEPHRINE)**

Indication : Acute allergic and anaphylactic reaction. Cardiac arrest

Route/Prep/Dose : 1 in 1000 — 1ml amp.
 Dose: 0.5ml S.C. or IM — repeated, if required.
 By I.V. infusion 5–10ml (0.5–1mg) of 1 in 10,000 (diluted).
 By intracardiac inj: 1–2ml of 1 in 10,000

S.E. : Anxiety; tremor; tachycardia; headache; cold extremities. In over dosage, arrhythmias, cerebral haemorrhage, pulmonary oedema.

S.P. : Ischaemic heart disease; diabetes mellitus; hyperthyroidism; hypertension.
 Increased risk of arrhythmias with antidepressants, digoxin or quinidine.

Brand/Cost

ADRENALIN : Inj : 1 in 1000, 1ml amp: Rs. 23.33 for 25 amp.
(Bengal Immunity)

10.5.2 DOPAMINE HCl

Indication : Cardiogenic shock in infarction or cardiac surgery. Septicaemic shock.

Route/Prep/Dose : Inj : 200mg/5ml amp.
Dose: In cardiogenic shock: 2–5 microgram per kg/minute (175–200 microgram/min.)
For septicaemic shock: 500–1200 microgram per minute. (Dose titrated to blood pressure response).

S.E. : Nausea; vomiting; peripheral vasoconstriction; hypotension; hypertension; tachycardia.

C.I. : Tachyarrhythmia.
Phaeochromocytoma.

S.P. : Correct hypovolaemia first if present.
Avoid extravasation (tissue necrosis).

Brand/Cost

DOPAMINE : Inj : 200mg/5ml: Rs. 65.00 for 5 amp
(TTK)

10.5.3 ISOPRENALINE: (See 10.2.3)**10.5.4 MEPHENTERMINE**

Indication : Treatment of hypotension

Route/Prep/Dose : Inj : 15mg/ml amp.
Dose: I.V. or I.M. range 15 to 60mg
Tab : 10mg
Dose: 2 tabs OD or BD

S.E. : Tachycardia; hypertension; arrhythmia; reduced renal blood flow

C.I. : Hypertension

Brand/Cost

MEPHENTINE : Inj : 15mg/ml: Rs. 2.21 for 1 amp.
(Wyeth) 30mg/ml: Rs. 18.14 for 10ml vial
Tab : 10mg: Rs. 10.94 for 20

10.6 PERIPHERAL VASODILATORS

10.6.1 CYCLANDELATE

Indication : Peripheral vascular disease.
Adjunct in management of senile dementia.

Route/Prep/Dose : Tab : 200mg, 400mg
1200-1600mg/day in divided doses.
Maintenance 400-800mg/day.

S.E. : Nausea, flushing; dizziness with high doses.

C.I. : Acute phase of cardiovascular accidents.

Brand/Cost

CYCLOSPASMOL : Tab : 200mg: Rs. 6.45 for 10
(Martin & Harris) 400mg: Rs. 12.18 for 10

10.6.2 CO-DERGOCRINE MESYLATE

Indication : Adjunct in management of senile dementia.

Route/Prep/Dose : Tab : 1mg
Dose: 1mg TID

S.E. : Nausea; vomiting; flushing; rashes; nasal congestion; postural hypertensive patient.

S.P. : Severe bradycardia.

Brand/Cost

HYDERGINE : Tab : 1mg: Rs. 110.68 for 30
(Sandoz) 1.5mg: Rs. 190.98 for 30

**10.6.3 NICOTINIC ACID DERIVATIVES
NICOFURANOSE**

Indication : Peripheral vascular disease.
Route/Prep/Dose : Enteric coated tab: 0.25g.
1-2g daily initially then 0.5g to 1g daily in divided doses.
S.E. : As for 10.6.2
S.P. : Diabetes mellitus

Brand/Cost

COMPLAMINA : Inj : 300mg per 2ml: Rs. 1.49 for amp.
(German Remedies) Tab : 150mg: Rs. 2.08 for 10

10.6.4 ISOXSUPRINE HCl

Indication : Cerebral and peripheral vascular disease;
placental insufficiency; premature labour.
Route/Prep/Dose : Tab : 10mg
Inj : 5mg/ml
2 tabs 3-4 times/day gradually reduced
with improvement.
Inj. IM or IV
S.E. : Flushing; tachycardia; nausea; vomiting;
palpitation.
C.I. : Recent arterial haemorrhage.

Brand/Cost

DUVADILAN : Inj : 10mg/2ml: Rs. 7.14 for 6 amps
Tab : 10mg: Rs. 15.06 for 50

10.6.5 OXPENTIFYLINE

- Indication : Peripheral vascular disease.
- Route/Prep/Dose : Tab : 400mg, 2-3 times daily
- S.E. : Nausea; dizziness; flushing
- S.P. : Hypotension

Brand/Cost

- TRENTAL : Dragees: 400mg: Rs. 145.00 for 30
(Hoechst)

10.7 HYPERLIPIDAEMIA — Drugs used in

Coronary atherosclerosis is affected by high level of low density lipoproteins (LDL). Drugs lowering the level of LDL or increasing high density lipoproteins (HDL) have beneficial effects. Drug therapy is only an adjunct to reduction of other risk factors, such as obesity, high blood pressure and smoking.

10.7.1 CHOLESTYRAMINE D I P

- Route/Prep/Dose : Powder: 4g sachet
Usually 12 – 24g daily in liquid, in single or divided doses.
Upto 36g daily in resistant cases.
- S.E. : Nausea, vomiting, diarrhoea, heart burn, flatulence, abdominal discomfort, rashes, rarely steatorrhoea with large doses.
- S.P. : Supplements of fat soluble vitamins and folic acid may be required with high dose.
- C.I. : Complete biliary obstruction; pregnancy.

Brand/Cost

- QUESTRAN : Currently not available in India
(Bristol-Meyer)

10.7.2 CLOFIBRATE **DI P H R**

- Route/Prep/Dose : Caps: 500mg
500mg 2-3 times daily after meals
- S.E. : Nausea, abdominal discomfort, rarely
myositis-like syndrome, pruritis, urticaria,
impotence, cholesterol cholelithiasis.
- C.I. : Severe renal or hepatic impairment
hypoalbuminaemia, primary biliary cirrhosis, gall
bladder disease, nephrotic syndrome. Pregnancy.

Brand/Cost

- ATROMID-S (ICI) : Rs. 120.00 for 100 caps

10.7.3 GEMFIBROZIL **DI H R P**

- Route/Prep/Dose : Caps: 300mg
1-2g daily normally, in 2 divided doses.
- S.E. : Gastro-intestinal disturbances, pruritis, rash,
headache, dizziness, blurred vision, painful
extremities, rarely myalgia
- S.P. : Lipid profile, blood counts and liver function tests
to be checked before initiating long term
treatment; renal impairment. Annual eye
examination
- C.I. : Alcoholism, hepatic impairment gall stones,
pregnancy.

11. CENTRAL NERVOUS SYSTEM

11.1 PSYCHOACTIVE DRUGS

These are hypnotics, anxiolytics, anti-psychotics and anti-depressants.

Hypnotics include benzodiazepines, chloral hydrate, chlormethiazole and promethazine. Barbiturates are no longer recommended because of their poor therapeutic index. Before a hypnotic is prescribed the cause of the insomnia should be established and treated. They should **NOT** be indiscriminately prescribed because of their high potential for physical and psychological dependence. Transient and short term insomnia due to serious medical illness, sudden emotional upheaval or occupational factors (e.g., shift work) are treated with rapidly eliminated hypnotics for brief periods (few days to few weeks). Intermittent use with omission of some doses is desirable. They are of no use in chronic insomnia caused by underlying psychiatric disorders. Tolerance develops within 3 to 14 days of continuous use and withdrawal causes rebound insomnia. Benzodiazepines used as hypnotics include Lorazepam, Nitrazepam, Flurazepam and Flunitrazepam. Withdrawal phenomena are more common with the shorter acting drugs.

Anxiolytic benzodiazepines such as diazepam and chlordiazepoxide can be effective in alleviating definite anxiety states. They should not be used to treat depressions, phobic, obsessional states or chronic psychosis. They are indicated for the short-term relief of severe, disabling anxiety that occurs alone or in association with insomnia, short-term psychosomatic, organic or psychotic illness. Side effects of benzodiazepines include drowsiness, ataxia, and paradoxical increase in hostility and aggression. Betablockers (e.g., propranolol, atenolol) do not affect psychological symptoms such as worry and tension but they do reduce autonomic symptoms and are therefore indicated for patients with predominantly somatic symptoms. Meprobamate is less effective than the benzodiazepines, more hazardous in overdose and can also induce dependence.

Antipsychotic drugs — phenothiazines, butyrophenones and thioxanthenes — generally tranquilise without impairing consciousness and without causing paradoxical excitement. They are used long term, in schizophrenia and affective disorders and short-term for toxic delirium, agitated depression, acute behavioural disturbance and severe anxiety. Some antipsychotics (e.g., chlorpromazine, thioridazine) also have an anti-depressant action. Of the known side effects, extra-pyramidal, sedative and anticholinergic symptoms are the most frequent and troublesome. Hypotension occurs as a dose related effect especially in the elderly. The neuroleptic malignant syndrome consisting of hyperthermia, rigidity and fluctuating levels of consciousness is a rare and potentially fatal side effect. Selection of an anti-psychotic depends on the degree of sedation required and the patient's susceptibility to side effects. In general, chlorpromazine has pronounced sedative effect and moderate anti-cholinergic and extra pyramidal effects, while thioridazine has marked anti-cholinergic, moderate sedative but fewer extrapyramidal effects. Fluphenazine, butyrophenones and thioxanthenes have pronounced extra pyramidal effects but fewer anti-cholinergic and sedative effects.

Tricyclic and related anti-depressants are the drugs of choice in the treatment of moderate to severe endogenous depression unless it is so severe that immediate electroconvulsive therapy is indicated. They are preferred to monoamine-oxidase inhibitors (MAOI) because they are more effective and do not show dangerous interactions with some foods and drugs that are characteristic of MAOI. Prescribing more than one anti-depressant and combinations with tranquilizers are not recommended. Improvement in sleep is usually the first benefit of therapy but this may take 2-4 weeks to occur. Agitated and anxious patients tend to respond best to the more sedative compounds such as amitryptiline while withdrawn and apathetic patients benefit from the less sedative imipramine. These two drugs are relatively safe and effective but have more marked anti-cholinergic and cardiac side effects than the newer compounds (doxepin, mianserin, trazadone). Limited quantities of anti-depressant drugs should be prescribed at any one time since these drugs are very dangerous in overdose.

Phobic patients, depressed patients with atypical, hypochondriacal or hysterical features and those refractory to other anti-depressants respond best to MAOIs. The drugs of choice are phenelzine and isocarboxazid which are safer and less stimulant than tranylcypromine which are safer and less stimulant than tranylcypromine which can cause hazardous stimulation. Other side effects include severe hypertensive reactions to tyramine containing foods (e.g. cheese) and hepatotoxicity. Tricyclic anti-depressants should not be used within 14 days of discontinuing an MAOI.

Lithium is the drug of choice for prophylaxis of manic-depressive psychosis. It can also be used in acute mania. Lithium toxicity (nausea, vomiting, diarrhoea, tremor, ataxia) can be avoided by staying within the therapeutic serum levels of 0.8 to 1.2 mEq/L.

11.1 SEDATIVES, HYPNOTICS & ANXIOLYTICS

11.1.1 LORAZEPAM D I P L

Indication : Short term use in anxiety, insomnia and neurosis.

Route/Prep/Dose : Tab : 1mg; 2mg
2-4mg in divided doses.
Insomnia: 1-4mg at bed time.

C.I. : Hypersensitivity to benzodiazepines; respiratory depression; myasthenia gravis.

S.P. : Pregnancy and lactation; alcohol; hepatic disease, glaucoma, drowsiness.

Brand/Cost

LARPOSE : Tab : 1mg: Rs. 1.87 for 10
(Cipla) 2mg: Rs. 3.29 for 10

ATVAN : Tab : 1mg: Rs. 2.94 for 10
(Wyeth) 2mg: Rs. 3.92 for 10

11.1.2 DIAZEPAM D I P L

Indication : Short term use in anxiety, insomnia and neurosis.
Alcohol withdrawal; muscle spasm.

Route/Prep/Dose : Tab : 2.5mg, 5mg, 10mg
Inj : 10mg/2ml amp.
2.5–30mg orally, daily in divided doses.
0.15–0.25mg/kg IV repeat Q 30 min. for seizures
and Q1–4 hours for tetanus.

C.I. : Hypersensitivity to benzo-diazepines; respiratory
depression; myasthenia gravis.

S.P. : Pregnancy and lactation; alcohol; hepatic
disease, glaucoma, drowsiness. Inject slowly.

Brand/Cost

CALMPOSE : Tab : 2mg: Rs. 1.56 for 10
5mg: Rs. 3.28 for 10
10mg: Rs. 4.46 for 10
Suspension: 2mg per 5ml: Rs. 8.27 for 60ml
Inj : 10mg per 2ml: Rs. 21.44 for 10 amps.

VALIUM : Tab : 2mg: Rs. 2.25 for 10
(Roche) 5mg: Rs. 3.29 for 10
10mg: Rs. 5.49 for 10
Inj : 10mg per 2ml: Rs. 13.32 for 6 amp.

11.1.3 NITRAZEPAM D I P L

Indication : Insomnia

Route/Prep/Dose : Tab: or Caps: 5mg, 10mg. 5 to 10mg at night.

C.I. : Hypersensitivity to benzo-diazepines; respiratory
depression; myasthenia gravis

S.P. : Pregnancy and lactation; alcohol; hepatic
disease; glaucoma; drowsiness.

Brand/Cost

NITRAVET : Tab : 5mg: Rs. 5.40 for 10
(Anglo French)

HYPNOTESE : Caps: 5mg: Rs. 3.75 for 10
(PCI) 10mg: Rs. 5.06 for 10

11.2 ANTIDEPRESSANTS

11.2.1 IMIPRAMINE DI

Indication : Depression, nocturnal enuresis.

Dose : Depression: 70–100mg at night.
Enuresis: upto 12 years: 25mg
at night, over 12 years: 50mg

C.I. : Concurrent administration of MAO inhibitors;
myocardial infarction; acute narrow angle
glaucoma.

S.P. : Children below 6 years; hypertension and
ischaemic heart disease; benign prostatic
hypertrophy; hyperthyroidism.

Brand/Cost

DEPSONIL : Tab : 25mg: Rs. 5.80 for 10
(SG Pharma)

DEPSONIL-PM : Tab : 75mg: Rs. 12.80 for 10
(SG Pharma)

11.2.2 AMITRIPTYLINE DI

Indication : Depression and anxiety

Route/Prep/Dose : Tab : 10mg, 25mg
Dose: 25–50mg at night or
10–20mg thrice daily
Max. 150mg/day.

- C.I. : Concurrent administration of MAO inhibitors; myocardial infarction; acute narrow angle glaucoma.
- S.P. : Children below 6 years; ischaemic heart disease; hypertension; hyperthyroidism.

Brand/Cost

TRYPTOMER : Tab : 10mg: Rs. 3.55 for 10
(Merind) 25mg: Rs. 6.39 for 10
75mg: Rs. 13.78 for 10

SAROTENA : Tab : 10mg: Rs. 2.65 for 10
(CFL Pharm) 25mg: Rs. 4.58 for 10

11.2.3 MIANSERIN DI

Indication : Depression (less cardiovascular effects, more sedation)

Route/Prep/Dose : Tab : 10mg, 20mg, 30mg
Dose: 30–60mg in single night dose or divided doses.

C.I. : Concurrent administration of MAO inhibitors.

S.P. : Occasionally causes bone marrow suppression; ischaemic heart disease; concurrent alcohol or other sedatives.

Brand/Cost

TETRADEP : Tab : 10mg: Rs. 15.00 for 10
(Torrent) 20mg: Rs. 29.00 for 10
30mg: Rs. 43.00 for 10

11.3 ANTIPSYCHOTICS

11.3.1 CHLORPROMAZINE DI P L H

- Indication : Schizophrenia; sedation; anaesthesia premedication.
- Route/Prep/Dose : Tab : 10mg, 25mg, 50mg, 100mg
Syrup: 5mg/5ml; 25mg/5ml
Inj : 50mg/2ml amp.
Dose : 25–100mg three times daily.
- C.I. : Hypersensitivity to drug; hepatic dysfunction; coma; blood dyscrasia; concurrent administration of amidopyrone or phenylbutazone.
- S.P. : Parkinsonism; epilepsy; pregnancy and lactation; drowsiness; hypotension;
N.B: Extrapyramidal symptoms common.

Brand/Cost

- LARGACTIL : Inj : 2ml amp: Rs. 33.35 for 10 amps.
(May & Baker) Syrup: 25mg/5ml: Rs. 13.43 for 125ml
Tab : 10mg: Rs. 2.66 for 10
25mg: Rs. 4.15 for 10
100mg: Rs. 8.06 for 10

11.3.2 TRIFLUOPERAZINE DI P L

- Indication : Anxiety; schizophrenia and psychosis.
- Route/Prep/Dose : Tab : 1mg; 5mg
Inj : 1mg/ml amp.
Dose: 1–2mg twice daily
5mg thrice daily
- C.I. : Hypersensitivity to drug; hepatic dysfunction; coma; blood dyscrasia, concurrent administration of amidopyrone or phenylbutazone.

S.P. : Parkinsonism; epilepsy; pregnancy and lactation; drowsiness; hypotension; N.B: Extrapyramidal symptoms common.

Brand/Cost

ESKAZINE

(Eskayef)

: Tab : 1mg: Rs. 4.81 for 12
5mg: Rs. 5.30 for 12
Inj : 1mg per ml: Rs. 9.00 for 5 amps.

11.3.3 HALOPERIDOL D I P L

Indication : Anxiety; schizophrenia; psychosis.

Preparation : Tab : 0.25mg, 1.5mg, 10mg
Syrup: 2mg/ml
Inj : 5mg/ml amp.

Dose : see literature

C.I. : Pregnancy and lactation; coma

S.P. : Parkinsonism; epilepsy; liver dysfunction; thyrotoxicosis.
N.B: Entrapyramidal symptoms common.

Brand/Cost

SERENACE

(Searle)

: Tab : 0.25mg: Rs. 3.02 for 10
1.5mg: Rs. 9.50 for 10
15mg: Rs. 21.47 for 10
Inj : 5mg per ml: Rs. 19.16 for 5 amp.
Liquid: 2mg/ml: Rs. 20.56 for 30ml

11.3.4 FLUPHENAZINE P L

Indication : Schizophrenia; psychosis (long acting)

Prep/Dose : Tab : 1mg
Inj : 25mg/ml
Dose: 1-10mg daily PO
25mg I.M. every 2-4 weeks

11.4.1 CARBAMAZEPINE DI

Route/Prep/Dose : Tab : 200mg
Dose: 600–1200mg/day — adult in divided doses
Child: 20–30mg/kg/24 hours in divided doses.

S.E. : Gastro-intestinal disturbances; dizziness; drowsiness; diplopia; rash; leucopaenia.

C.I. : Previous sensitivity; atrio-ventricular conduction abnormalities. Patients on MAO treatment or within 2 weeks of such treatment.

Brand/Cost

MAZETOL : Tabs: Rs. 172.86 for 100
(S.G. Pharma)

CARBAMAZEPINE : Tab : 200mg: Rs. 175.00 for 100
(Curemed)

11.4.2 DIAZEPAM

Route/Prep/Dose : Inj : 5mg/ml — 2ml amp.
Dose: 10–20mg at a rate of 2.5mg per 30 seconds repeated if necessary after 30–60 minutes.
May be followed by slow I.V. infusion to a max. of 3mg/kg. Child: 0.2mg/kg/dose slow I.V.

S.E. : Respiratory depression

C.I. : Benzodiazepine sensitivity; myasthenia gravis; acute narrow angle glaucoma.

Brand/Cost

VALIUM (Roche)/
CALMPOSE
(Ranbaxy) : See 11.1.2

11.4.3 ETHOSUXIMIDE DI

- Route/Prep/Dose : Syrup: 250/5ml
Dose : Child: 20–40mg/kg/day
- S.E. : Gastro-intestinal disturbances; dizziness;
drowsiness; ataxia; psychotic states; rashes;
leucopenia; agranulocytosis rarely.
- C.I. : Porphyria

Brand/Cost

- ZARONTIN : Rs. 14.11 for 114ml.
(Parke-Davis)

11.4.4 PHENOBARBITAL DI

- Route/Prep/Dose : Tab : 30mg, 60mg
Inj : 200mg/ml ampoule
Dose: orally 30–180mg at night
child: 5–8mg/kg daily
- S.E. : Drowsiness; lethargy; mental depression; ataxia;
allergic skin reactions; restlessness; confusion in
elderly; hyperkinesia in children; megaloblastic
anaemia.
- S.P. : Elderly; children; pregnancy; breast feeding. May
cause dependence.
- C.I. : Porphyria

Brand/Cost

- GARDENAL
SODIUM : Tab : 30mg: Rs. 1.20 for 10
May & Baker) 60mg: Rs. 1.27 for 10

- C.I. : Renal or hepatic dysfunction
- S.P. : Pregnancy, lactation; convulsive disorders. Extrapyramidal symptoms common.

Brand/Cost

- ANATENSOL : Tab : 1mg: Rs. 2.45 for 10
(Sarabhai) Inj : 25mg per ml: Rs. 12.07 for 1ml vial

11.3.5 LITHIUM CARBONATE D I P L

- Indication : Mania; manic depressive psychosis.
- Route/Prep/Dose : Tab & Caps: 150mg, 300mg
Dose: 600–900mg daily. Ideally monitor serum levels to 0.7 — 1.0 mEq/litre
- C.I. : Renal or cardiac disease; pregnancy and lactation; hypothyroidism.
- S.P. : Concomittent use of diuretics; hyponatraemia, monitor electrolytes and thyroid function.

Brand/Cost

- LITHOCARB : Caps: 150mg: Rs. 17.81 for 50
(Merck) 300mg: Rs. 14.27 for 30
- LICAB : Tab : 300mg: Rs. 4.50 for 10
(Torrent)

11.4 ANTIEPILEPTICS

The aim in treating should be to prevent occurrence of seizures by maintaining adequate plasma concentrations of the drugs. The dose should be low to start with and the frequency should be as low as possible for better compliance. Concurrent therapy with several drugs should be avoided. It is best to control with a single antiepileptic drug. A second drug should only be added if seizures continue despite high plasma concentrations or toxic effects are seen. Another disadvantage of multiple therapy is that drug interactions occur between various

antiepileptic drugs. Due to liver enzyme induction, phenobarbitone, phenytoin, primidone and carbamazepin may increase each other's metabolism and reduce plasma concentrations.

Abrupt withdrawal of antiepileptics particularly the barbiturates and benzodiazepines should be avoided as this may precipitate severe rebound seizures. Reduction of dosage should be gradual and change over of drugs in the regimen should be cautiously done. Epileptic patients should be discouraged to drive motor vehicles. During pregnancy and breast feeding, care should be taken. Some of them, like phenytoin are teratogenic. Breast feeding is acceptable if taking normal doses with the possible exception of barbiturates.

PHENYTOIN is effective in tonic clonic and partial seizures. This has a narrow therapeutic index and small increase in dosage produce large rises in plasma concentration with acute toxic effects. Hence dose should be carefully adjusted. Phenytoin causes coarse facies, acne, hirsutism, gingival hyperplasia, nystagmus etc.

CARBAMAZEPINE is drug of choice for simple and complex partial seizures and for tonic clonic seizures. It has a wider therapeutic index than phenytoin and fewer side effects than phenytoin or barbiturates. It causes dose related blurred vision, dizziness and unsteady gait.

PHENOBARBITONE is an effective drug but may produce rebound seizures on withdrawal. It could produce sedative effects in adults and behavioural disturbances and hyperkinesia in children.

SODIUM VALPROATE is effective in controlling tonic clonic seizures, particularly in primary generalised epilepsy. There have been reports on severe hepatic and pancreatic toxicity. These are rare.

CLONAZEPAM is occasionally used in tonic clonic or partial seizures. Sedative effects are prominent.

DIAZEPAM is used in status epilepticus and in convulsions due to poisoning. Febrile convulsions need only simple treatment like sponging and paracetamol. For prolonged and recurrent febrile convulsions, diazepam is the drug of choice given as a slow IV injection.

11.4.5 PHENYTOIN SODIUM D I P H

Route/Prep/Dose : Tab : 100mg
Dose : 100mg TID before meals.
Child: 3-8mg/kg in divided doses.
Suspension: 100mg/4ml
Inj : 100mg/2ml, 5-10mg/kg IV. In status epilepticus upto a maximum of 1g followed by maintenance dose

S.E. : Nausea; vomiting; mental confusion; dizziness; headache; tremor; insomnia; ataxia; slurred speech; nystagmus; blurred vision; lymphadenopathy; gingival hypertrophy.

C.I. : Fever; hepatitis; lupus erythamatosi

Brand/Cost : See 10.2.4.

11.4.6 PRIMIDONE D I

Route/Prep/Dose : Tab : 250mg
Dose: 1 tab at bed time. Dose range upto 1g/day.

S.E. : As under Phenobarbitone (11.4.4)

Brand/Cost

MYSOLINE : Tab : Rs. 5.83 for 100 (IEL)

11.4.7 SODIUM VALPROATE D I H P L

Route/Prep/Dose : Tab : 200mg
Dose: Adult: 30-60mg/kg daily
Child: 20-30mg/kg daily

S.E. : Gastro-intestinal irritation; increased appetite and weight gain; transient hair loss; oedema; thrombocytopaenia; impaired hepatic function; rarely pancreatitis.

C.I. : Active liver disease

S.P. : Children; history of liver disease; pregnancy; breast feeding

Brand/Cost

EPILEX : Tab : 200mg: Rs. 13.00 for 12
(Reckitt Colman)

VALPARIN : Tab : 200mg: Rs. 7.00 for 10
(Torrent)

11.5 ANTIMIGRAINE DRUGS

11.5.1 ERGOTAMINE TARTARATE

Route/Prep/Dose : Tab : 2mg
Dose: 2mg initially, followed by 1mg every 30 minutes (range 1–5mg)

S.E. : Headache; nausea; vomiting

C.I. : Pregnancy; peripheral vascular disease; sepsis; breast feeding.

S.P. : Renal, hepatic and cardiovascular disease.

Brand/Cost

GYNERGEN : Inj : Rs. 7.47 for 6 amps
(Sandoz) Tab : Rs. 7.22 for 15

11.5.2 ERGOT

Route/Prep/Dose : Tab : prepared ergot 270mg

Brand/Cost

ERBOLIN : Tab : Rs. 50.65 for 1000
(Glaxo)

11.5.3 PROPRANOLOL : See 10.1.5

11.5.4 CLONIDINE : See 10.3.1

11.6 ANTIPARKINSONISM DRUGS

In the drug therapy of Parkinsonism, Levodopa improves all clinical manifestations. Concurrent administration of a decarboxylase inhibitor permits 75% reduction in the daily dose of levodopa. Combination levodopa and decarboxylase inhibitor is the treatment of choice for patients disabled by idiopathic Parkinson's disease e.g., Carbidopa. It is less effective in patients with post-encephalitic Parkinsonism and should be avoided in drug induced Parkinsonism. Reserpine, Phenothiazine and Pyridoxine counter the effect of levodopa and should not be used along with it.

Anticholinergics may be used as first line drugs in mild cases, particularly with tremor and rigidity or as adjunctive therapy with levodopa. These are effective in drug induced and in post-encephalitic Parkinsonism. All patients with Parkinsonism do not require drug therapy. Anti-histamines are particularly useful in elderly patients with mild disease, who cannot tolerate anticholinergic drugs. Relatively inactive patients with minimal disease and no disability may be treated with physiotherapy alone. Amantidine is an useful alternative to anticholinergics in patients with mild disease. Patients with severe disease, who cannot tolerate levodopa and for those who get frequent "on and off phenomena", Bromocryptine can be used.

11.6.1 DOPAMINERGIC DRUGS

11.6.1.1 AMANTADINE

Route/Prep/Dose : Cap : 100mg
Dose: 100mg BD

S.E. : Nervousness; insomnia; gastro-intestinal disturbances; skin discolouration; peripheral oedema; rarely leucopenia.

C.I. : Epilepsy
Gastric ulcer

Brand/Cost

AMANTREL : Cap : 100mg: Rs. 18.22 for 10
(Cipla)

11.6.1.2 BROMOCRIPTINE

Route/Prep/Dose : Tab : 2.5mg

Dose: Start with ½ tab/day with meals; increase by 1 tab every 2–4 weeks till maximum therapeutic effect achieved.

S.E. : Nausea; vomiting; constipation; postural hypotension; dyskinesia; dry mouth; leg cramps; digital vasospasm.

S.P. : Monitor for pituitary enlargement. Severe cardiovascular disease. Monitor for peptic ulceration. Psychotic disorders.

C.I. : Sensitivity to ergot alkaloids.

Brand/Cost

PROCTINAL : Tab : 2.5mg: Rs. 222.00 for 30
(Biddle Sawyer)

11.6.1.3 LEVODOPA D I H R

Route/Prep/Dose : Tab : 500mg

Dose: Initially 250mg to 1g/day in divided doses.
May be increased upto 8g/day.

S.E. : Gastro-intestinal disturbance; psychiatric symptoms; tachycardia; postural hypotension.

S.P. : Pulmonary disease; peptic ulcer; glaucoma; cardiovascular disease; hepatic and renal disease. Patients taking phenothiazine.

Brand/Cost

LEVOPA : Tab : 500mg: Rs. 19.03 for 10
(Carter Wallace)

11.6.1.4 LEVODOPA + CARBIDOPA DI H R

Route/Prep/Dose : Tab : Levodopa 250mg
Carbidopa 25mg
Dose: Tab 1 BD gradually increased to 1 TID

S.E./S.P./C.I. : As under LEVADOPA

Brand/Cost

SINEMET-110 : Levodopa 100mg
(Merind) Carbidopa 10mg
Rs. 505.75 for 100

SINEMET-PLUS : Levodopa 100mg
(Merind) Carbidopa 25mg
Rs. 421.80 for 100

SINEMET-275 : Levodopa 250mg
(Merind) Carbidopa 25mg
Rs. 505.75 for 100

11.6.2 ANTICHOLINERGICS**11.6.2.1 PROCYCLIDINE HCl H R P**

Route/Prep/Dose : Tab : 2.5mg, 5mg
Dose: Initially 2.5mg TID after food. Increase by 2.5mg daily; usual max. dose 30mg/day

S.E. : Dry mouth; gastro-intestinal disturbances;
blurred vision; psychiatric disturbance.

S.P. : Urinary retention; glaucoma; cardiovascular
disease; hepatic and renal dysfunction;
pregnancy.

Brand/Cost

KEMADRIN
(B.W.)

: Tab : 2.5mg: Rs. 2.15 for 10
5mg: Rs. 4.19 for 10

11.6.2.2 TRIHEXYPHENIDYL H R P

Route/Prep/Dose : Tab : 2mg
Dose: 1mg on 1st day; increase by 2mg every 5
days upto a total of 10mg/day

S.E. : As for Procyclidine

S.P. : Glaucoma

Brand/Cost

PACITANE
(Lederle)

: Tab : 2mg: Rs. 3.10 for 10

12. DRUG USED IN DERMATOLOGY

12.1 ANTIFUNGAL & ANTIINFECTIVE

12.1.1 WHITFIELD OINTMENT

Indication	:	Fungal infection of feet and hands
Use	:	Local application twice daily
C.I.	:	Groins and moist areas
Preparation	:	Benzoic acid 6% Salicylic acid 3%

Brand/Cost

WHITFIELD OINT : Rs. 2.90 for 15g
(Jilic Chem)

WHITEFIELD OINT : Rs. 30.00 for 450g
(Makers)

12.1.2 MICONAZOLE P L

Indication	:	Fungal infection
Use	:	Local application thrice daily
C.I.	:	Avoid contact with eyes
S.P.	:	Pregnancy and lactation
Preparation	:	2% ointment and lotion

Brand/Cost

MICOGEL : Cream: Rs. 3.45 for 5g
(Cipla)

ZOLE : Oint. : Rs. 3.19 for 5g
(Gufic) Lotion: Rs. 7.60 for 15ml

12.1.3 NYSTATIN

- Indication : Cutaneous and muco-cutaneous candidiasis.
- Use : Local application thrice daily
- Preparation : Vaginal tab : 100,000 U
Vaginal Oint: 100,000 U/g
Oral: 500,000 U tab

Brand/Cost

- MYCOSTATIN : Tab : 500,000 U: Rs. 24.13 for 12
(Sarabhai) Vag. tab: 100,000 U: Rs. 10.86 for 12
Oint: 100,000 per gram: Rs. 6.67 for 10g

12.1.4 GRISEOFULVIN DI H P

- Indication : Fungal infection of skin, nails and scalp
- Use : 500–1000mg daily with meals in divided doses.
Children 10mg/kg/day
- C.I. : Liver disease, pregnancy, moniliasis
- S.P. : Monitor liver functions
- Preparation : 125mg tabs.

Brand/Cost

- GRISOVIN FP : Tab : Rs. 4.49 for 10
(Glindia)
- IDIFULVIN : Tab : Rs. 4.12 for 10
(IDPL)

12.1.5 KETOCONAZOLE H P L

- Indication : Fungal infection especially vaginitis and with systemic involvement.
- Use : 200–400mg daily

C.I. : Liver disease, pregnancy and lactation, children below 12 years

S.P. : Monitor liver functions

Preparation : Tab : 200mg

Brand/Cost

FUNGICIDE : Tab : 200mg: Rs. 65.00 for 10
(Torrent)

12.1.6 GENTIAN VIOLET

Indication : Impetigo and furuncles

Use : Local application twice daily

Preparation : 1% solution

12.1.7 POVIDONE IODINE : (See 15.9.2)

Indication : Abrasions, ulcers and superficial infection of skin

Use : Local application twice daily

C.I. : Iodine sensitivity

Preparation : 5% ointment, solution

Brand/Cost

BETADINE : Oint : 5%: Rs. 9.96 for 25g
(Wockhardt) Solution: 5%: Rs. 17.59 for 100ml

PIODIN : Oint : 10%: Rs. 8.73 for 10g
(Croydon) Solution: 10%: Rs. 9.38 for 50ml

12.1.8 NEOMYCIN-BACITRACIN R

Indication : Abrasions, ulcers and superficial infections of skin.

Use : Local application twice daily

S.P. : Nephro/oto toxicity is possible especially if used with systemic neomycin or aminoglycosides

Preparation : Polymixin 5000 U +
Neomycin 3400 U +
Bacitracin 4000 as powder and ointment

Brand/Cost

NEOSPORIN : Oint: Rs. 3.29 for 5mg
(Wellcome)

12.1.9 SOFRAMYCIN

Indication : Abrasions, ulcers and superficial infections of skin

Use : Local application twice daily

S.P. : Hypersensitivity

Preparation : 1% cream

Brand/Cost

SOFRAMYCIN-Skin: Cream: 1%: Rs. 5.24 for 15g
(Roussel)

12.2 ANTI-INFLAMMATORY DRUGS (TOPICAL)

12.2.1 BETAMETHASONE

Indication : Eczema, psoriasis, lichen simplex and planus, contact dermatitis, seborrheic dermatitis.

Use : Local application 2-3 times daily

C.I. : Acne, scabies, fungus or bacterial disease, unless associated with effective anti-infective drug.

S.P. : Sudden withdrawal can lead to flare up of lesions. Prolonged use can lead to adrenal suppression.

Preparation : 0.12% cream, plain or with neomycin or chionoform.

Brand/Cost

BETNOVATE : Betnovate Oint: Rs. 10.22 for 15g

BETNOVATE C : Betnovate C-Oint: Rs. 10.92 for 15g

BETNOVATE N : Betnovate N-Cream: Rs.10.92 for 15g
(Glaxo)

12.2.2 FLUOCINOLONE

Indication : As for 12.2.1

Use/C.I./S.P. : As for 12.2.1
High potency preparation to be used sparingly.

Preparation : 0.025, 0.1% cream and lotion, plain or with neomycin or chionoform.

Brand/Cost

FLUCORT : Oint: Rs. 4.14 for 5g

FLUCORT N : Oint: Rs. 8.43 for 15g

FLUCORT C : Oint: Rs. 7.40 for 15g
(Lyka)

12.3 KERATOLYTICS & ANTI-ACNE PREPARATIONS

12.3.1 SALICYLIC ACID

Indication : Psoriasis, palmar or plantar hyperkatois (corns) and feet fissures.

Use : Local application 2-3 times daily

C.I. : Eyes and mucous membranes

Preparation : 5%, 10% ointment; 16.5% liquid

12.3.2 DITHRANOL

- Indication/Use : As for 12.3.1
- C.I. : Eyes and mucous membranes
Acute or pustular psoriasis.

Brand/Cost

- DEROBIN SKIN : Oint: Rs. 8.65 for 25g
(Allenburys)

12.3.3 TRETINOIN

- Indication : Acne
- Use : Local application 2 times daily.
- C.I. : Acute dermatitis, cuts and abrasions.
- S.P. : Avoid eyes and mucous membranes.
Avoid sunlight.

- Preparation : 0.05% cream

Brand/Cost

- EUDYNIA : Cream: 50mg per 100g: Rs. 12.00 for 20g
(German Remedies)

12.4. SOOTHING AND PROTECTIVE DRUGS

12.4.1 CALAMINE

- Indication : Symptomatic relief of pruritic lesions.
- Use : Local application as needed.
- Preparation : Calamine 8%

Brand/Cost

- CALAMINE
LOTION : Rs. 5.71 for 110ml.
(Boots)

BELLE CREAM : Oint: 2%: Rs. 6.75 for 20g
(Bell Pharma)

12.4.2 ZINC OXIDE

Indication : Soothing agent and sunscreen

Preparation : Cream

Use : Local application as needed

12.4.3 DIMETHICONE

Indication : Soothing agent, barrier cream for napkin rash, intertrigo.

Use : Local application as needed

Preparation : Dimethicone 20% with Zinc oxide and calamine.

Brand/Cost

SILODERM

OINTMENT : Oint: Rs. 6.80 for 20g

(Neo Pharma)

12.5 SCABICIDES & PEDICULOCIDES

12.5.1 BENZYL BENZOATE

Indication : Scabies and pediculosis

Use : Apply uniformly over the body from neck down after a hot bath; 2nd application within 5 days.

S.P. : Prevent contact with eyes.
Apply from neck down only.

Preparation : 25% emulsion

Brand/Cost

ASCABIOL : Liquid emulsion: 25%: Rs. 4.67 for 50ml.
(May & Baker)

12.5.2 GAMMA BENZENE

Indication : Scabies and pediculosis.

Use : Apply uniformly over the body from neck down after a hot bath; 2nd application within 5 days.

S.P. : Prevent contact with eyes.
Apply from neck down only.

Preparation : 1% lotion or ointment

Brand/Cost

GAB : Lotion: Rs. 3.90 per 25ml
(Gufic) Oint : Rs. 3.00 for 15g

12.6 MISCELLANEOUS**12.6.1 AMMOIDINE P H**

Indication : Depigmented lesions

Use : 0.7mg/kg orally followed by exposure of lesion to sunlight for 2-5 minutes initially — also ointment for local application.

C.I. : Pregnancy and liver disease
Children below 12 years.

S.P. : Avoid eyelids, lips and genitalia

Preparation : Tab : 10mg
Oint; 0.75%

Brand/Cost

MELANOCYL : Oint : Rs. 12.40 for 25g
(Franco-Indian) Solution: Rs. 12.62 for 25ml
Tab : 10mg: Rs. 16.82 for 40

12.6.2 PSORALEN P

Indication : Vitiligo
Use : 0.6–0.7mg/kg orally or local application followed by graded exposure to sunlight.
C.I. : Porphyria, SLE, leukoderma associated with leprosy. Pregnancy.
S.P. : Hypertension and heart disease. Overexposure to sunlight.
Preparation : Tab: 5mg, 10mg
Oint & Solution: 0.25%

Brand/Cost

PSORLINE : Oint : Rs. 4.46 for 15g.
(Franco Indian) Solution: 0.25%: Rs. 4.73 for 10ml
Tab : 5mg: Rs. 7.57 for 24

12.6.3 PARA AMINO BENZOIC AICD (PABA)

Indication : Sunscreen agent, often used with psoralens.
Use : Local application before exposure to sunlight or UV light.
Preparation : 10% cream

Brand/Cost

PARAMINOL : Cream: 10% Rs. 5.42 for 25g.
(Franco Indian)

13. DIAGNOSTIC AGENTS

13.1 CONTRAST MEDIA IN RADIOLOGY

13.1.1. GASTRO-INTESTINAL TRACT

13.1.1.1. Barium

Barium sulphate, B.P. suspension: 50% W/V

BARIUM MEAL

MICROBAR Suspension: Rs. 68.00 for 1 litre (ESKAY)

BARIUM ENEMA

MICROBAR, powder: Rs. 200.00 for 5 kg (ESKAY)

13.1.1.2. Cholecystography

13.1.1.2.1. Iopanoic Acid/Sod. Iopodate

Prep/Route : Iodine content: 66.7% W/V
Oral

Brand/Cost

TELEPAQUE : Rs. 33.00 for 6 tabs.
(Dey's Medical)

Prep/Route : Iodine content: 35% W/V; IV inj

BILIGRAFIN : Rs. 793.00 for 10 amps
(Schering)

13.1.2 IV PYELIGRAPHY, ANGIOGRAPHY, ANGIOCARDIOGRAPHY, AORTOGRAPHY, VENOGRAPHY.

13.1.2.1 Iothalamate

Prep/Route : Meglumine iothalamate: 60% W/V
Iodine content: 280 mg/ml IV inj.

S.P. : 1 ml test dose; wait for 15 min; then full dose.

C.I. : Iodine sensitivity; severe cardiovascular disease; thyrotoxicosis

Brand/Cost:

CONRAY 280 : Rs. 49.33 for 20 ml amp.
(M & B)

Prep/Route : Sodium iothalmate: 70% W/V
Iodine content: 420 mg/ml; IV inj.

Brand/Cost:

CONRAY 420 : Rs. 70.35 for 20 ml amp.
(M & B)

13.1.2.2. Meglumine Diatrizoate

Prep/Route : Iodine content: 306 mg/ml
IV inj.

S.P./C.I. : as for 13.1.2.1

Brand/Cost

ANGIOGRAFIN : Rs. 146.00 for 50 ml
(Schering)

13.1.2.3. Sodium and Meglumine Diatrizoate

Prep/Route : Mixture: equal proportion

S.P./C.I. : as for 13.1.2.1

Brand/Cost

UROGRAFIN-60% : Iodine content: 292 mg/ml
(German Remedies) Rs. 263.00 for 5 amps (20 ml amp)

UROGRAFIN-76% : Iodine content 370 mg/ml
(German Remedies) Rs. 308.00 for 5 amp (20 ml amp)

UROVISION : Mixture: Sodium and meglumine diatrizoate
(Schering) in the ration 40:18
Iodine content: 325 mg/ml
Rs. 146.00 for 50 ml

13.1.2.4. Iopamidol

Preparation : Iodine content: 300 mg/ml
Low osmality

S.P./C.I. : as for 13.1.2.1

Brand/Cost

IOPAMIRO : Rs. 352.00 for 10 ml
(Pharmed)

13.1.3. MYELOGRAPHY

13.1.3.1. Metrizamide

METRIZAMIDE :
(Winthrop)

OMNIPAQUE-180 : Iodine content: 180 mg/ml
Rs. 128.48 for 10 ml

-240 : Iodine content: 240 mg/ml
Rs. 250.48 for 10 ml

-300 : Iodine content: 300 mg/ml
Rs. 269.45 for 10 ml

13.1.4. BRONCHOGRAPHY

13.1.4.1. Propyliodone

Preparation : 60% W/V only Iodine content: 340 mg/ml

Brand

DIONOSIL (Oily) : Rs. 188.00 for 20 ml amp.
(Glaxo)

Preparation : 50% W/V; aqueous

DIONOSIL

13.1.5. LYMPHANGIOGRAPHY

13.1.5.1. Iodized Oil

Preparation : Iodine content: 480 mg/ml

LIPIODOL

13.2. TUBERCULIN (PPD) — Please see 22.1

13.3. OPHTHALMIC

FLUORSCEIN

FLUORE (Stain) : Strips: Fluorescein sodium 4%
Rs. 30.00 for 100 strips

14. DISINFECTANTS

14.1 ALCOHOL

(Industrial Methylated spirit)

Indication : Skin preparation before injection.

S.P. : Flammable. Avoid broken skin.

Brand/Cost

SURGICAL SPIRIT

14.2 CETRIMIDE

Indication : Skin disinfection. Soap or shampoo substitute in acne, skin infections and seborrhoea of scalp. Active against gram positive but not gram negative bacilli.

Preparation/Dose : Solution: 500ml.

S.E. : Skin irritation and occasional sensitisation.

S.P. : Avoid contact with eyes.
Avoid use in body cavities.
Use recommended solutions.

Brand/Cost

CETAVALON : Liquid: 0.5%: Rs. 17.26 for 500ml.
(IEL) 20% w/w: Rs. 11.09 for 100ml.

14.3 CHLORHEXIDINE

Indication : Skin disinfection such as pre-operative skin preparation, obstetric and wound cleansing, bladder irrigation. Active against gram +ve but not so effective against gram-ve bacilli.

Brand/Cost

HIBITANE : Liquid: 5% w/v: Rs. 81.13 for 1 ltr.
(IEL)

HIBISCRUB : Liquid: 4% w/v: Rs. 111.10 for 500ml.
(IEL)

14.4 COMBINATION OF CETRIMIDE & CHLORHEXIDINE

Preparation/Dose : Chlorhexidine 7.5%
Cetrimide 15%

S.P. : Use recommended dilutions.

Brand/Cost

SAVLON : Hospital concentrate:
(IEL) Liquid: Rs. 88.59 per litre
Liquid antiseptic: Rs. 4.73 for 100ml.

14.5 CHLORINATED SOLUTIONS

CHLORINATED LIME & BORIC ACID

Indication : Skin disinfection particularly wound and ulcer cleaning.

S.P. : Bleaches fabric; solution may be irritant. Solution must be freshly prepared.

Brand : Eusol

14.6 HYDROGEN PEROXIDE

Indication : Skin disinfection, particularly cleansing and deodorising wounds and ulcers.

S.P. : Bleaches fabric; solution above 6% should be diluted. Protect from light. Store in closed, well filled containers.

14.7 IODINE COMPOUNDS

14.7.1 IODINE SOLUTION (Weak)

Indication : Skin disinfection; soap or shampoo substitute in acne, skin infection and seborrhoea of scalp.
Preoperative skin preparation.

Preparation/Dose : As a 1% solution in 70% alcohol for preoperative skin preparation.

14.7.2. POVIDONE IODINE

Indication : Boils, furuncles, impetigo, sycosis barbae, otitis externa, secondary infection of burns, wounds
fungal infections, tinea pedis, cutaneous candidiasis.

Preparation/Dose : Ointment : 5%
Solution: 5%

Brand/Cost

BETADINE : Solution: 5%: Rs. 17.59 for 100ml
(Wockardt) Surgical scrub: 7.5%: Rs. 90.80 for 500ml.

14.7.3 IODOPHOR

Indication : Hand and skin disinfection

Brand/Cost

POLYSAN : 5 litre container: Rs. 347.75
(Polypharma)

15. DIURETICS

THIAZIDES are used to relieve oedema due to heart failure. They are also used in lower doses to reduce blood pressure. The more potent 'loop' diuretics such as FRUSEMIDE or BUMETANIDE are used in patients with pulmonary oedema due to left ventricular failure and in patients with long standing heart failure who no longer respond to the thiazides. Diuretics are usually administered early in the day so that the diuresis does not interfere with sleep. Hypokalaemia may occur with both thiazide and loop diuretics. Often the use of potassium sparing diuretics like spironolactone, triamterene, and amiloride avoids the need to take potassium supplements.

15.1 AMILORIDE + HYDROCHLOROTHIAZIDE P H

Indication : Oedema. potassium conservation with thiazide and loop diuretic. Mild to moderate hypertension.

Route/Prep/Dose : Tab : Amiloride 5mg
Hydrochlorothiazide 50mg.
Dose: 1-2 tab a day.

S.E. : Rashes; mental confusion

S.P./C.I. : Pregnancy; diabetes mellitus; hepatic cirrhosis.

Brand/Cost

BIDURET : Tab : Rs. 3.40 for 10
(Biddle Sawyer)

KSPAR : Tab : Rs. 60.80 for 100
(Ebers)

15.2 ACETAZOLAMIDE R: See 17.1.3

15.3 CHLORTHALIDONE R

Indication : Oedema; hypertension; diabetes insipidus.

Route/Prep/Dose : Tab : 100mg
Dose: 1-2 tabs 3 times a week

- S.E. : Rashes; thrombocytopaenia; impotence.
- C.I. : Renal failure; hypercalcaemia; Addison's disease.
- S.P. : Severe ischaemic heart disease; cerebral atherosclerosis.

Brand/Cost

HYTHALTON : Tab : 100mg: Rs. 9.33 for 10
(SG Pharma)

15.4 HYDROCHLOROTHIAZIDE: See 10.3.3

15.5 FRUSEMIDE DI P H

- Indication : Oedema; oliguria due to renal failure.
- Route/Prep/Dose : Tab : 40mg
Inj : 10mg/ml — 2ml amps.
Dose: 1 tab a day increased as desired.
Inj : 20mg–40mg I.M. or slow I.V. Child:
1–3mg/kg daily. In oliguria initially 250mg daily, if necessary larger doses increasing in steps of 250mg may be given every 4–6 hours to a maximum of a single dose of 2g. By intravenous infusion in oliguria 0.25–1g at a rate not more than 4mg/minute.
- S.E. : Rashes; tinnitus and deafness in impaired renal function.
- C.I. : Liver cirrhosis.
- S.P. : Pregnancy; hypokalaemia and hyponatraemia; aggravates diabetes and gout; liver failure; prostatism.

Brand/Cost

LASIX : Inj : 20mg per 2ml amp: Rs. 11.87 for 10 amp.
(Hoechst) Tab : 40mg: Rs. 41.15 fo 250

LASIX (high dose) : Tab : 500mg
(Hoechst)

15.6 BUMETANIDE D I P H

Indication : Oedema; oliguria due to renal failure.

Route/Prep/Dose : Tab : 1mg
Dose: 1-4mg/day. Max: 15mg/day
Child: 0.05mg/kg/day

S.E./S.P./C.I. : See under Frusemide (15.5)

Brand/Cost

BUMET : Tab : 1mg: Rs. 4.22 for 10
(Montari)

15.7 MANNITOL

Indication : Forced diuresis; cerebral oedema; increased intraocular tension.

Route/Prep/Dose : 20% infusion: 350ml
Dose: 100-200ml over 20-30 min. and repeated as required.

S.E. : Chills; fever

S.P. : Extravasation, causes inflammation and thrombophlebitis

C.I. : Congestive cardiac failure; pulmonary oedema.

Brand/Cost

MANNITOL : Inj : 20% 0.2g/ml: Rs. 16.55 for 350ml.
(Unichem)

15.8 SPIRONOLACTONE D I P R

Indication : Oedema in cirrhosis liver, nephrotic syndrome; congestive cardiac failure; potentiation of thiazide and loop diuretics; primary aldosteronism.

Route/Prep/Dose : Tab : 25mg
Dose: 100–200mg daily
Max: 400mg/day
Child: 3mg/kg in divided doses.

S.E. : Gastro-intestinal disturbances; gynaecomastia.

C.I. : Hyperkalaemia; renal failure

Brand/Cost

ALDACTONE : Tab : 25mg: 11.66 for 10
(Searle) 100mg: Rs. 44.10 for 10

15.9 TRIAMTERENE + BENZTHIAZIDE: See 10.3.14

16. EAR, NOSE and THROAT

16.1 EAR

16.1.1 CHLORAMPHENICOL

Indication	: Otitis externa, media and after mastoid surgery
Preparation	: Drops: 1%, 5%
Dose	: 2–3 drops 3 times daily
C.I.	: Sensitivity to drug
S.P.	: Bone marrow suppression possible.

Brand/Cost

CHLOROMYCETIN

EAR DROPS : Drops: 5%: Rs. 3.50 for 5ml
(Parke Davis)

KEMICETIN

EAR DROPS : Drops: 1%: Rs. 3.20 for 10ml
(Mac) 5%: Rs. 2.90 for 6ml

16.1.2 GENTAMICIN

Indication	: Otitis externa, media and after mastoid surgery.
Preparation	: Drops: 0.3%
Dose	: 2–3 drops 3 times daily
C.I.	: Sensitivity to drug +

Brand/Cost

GENTICYN EAR

DROPS : Drops: Rs. 3.49 for 3ml
(Nicholas)

16.1.3 HAMYCIN

Indication	: Otomycosis due to <i>Aspergillus niger</i> .
Preparation	: 200,000 U/ml
Dose	: 2-3 drops 3 times daily
C.I.	: Sensitivity to drug

Brand/Cost

HAMYCIN SOLUTION (HAL)	: 200,000 U per ml: Rs. 8.27 for 10ml
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16.1.4 DIBUCAINE

Indication	: Relief of inflammatory pain
Preparation	: Solution: 1.1%
Dose	: 5 drops 3-4 hourly.
C.I.	: Sensitivity to drug
S.P.	: Infections may need associated antibiotic therapy

Brand/Cost

OTOGESIC (Ethnor)	: Drops: Rs. 10.81 for 5ml
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16.1.5 PARADICHLOROBENZENE

Indication	: To dissolve ear wax
Preparation	: Drops: 2%
Dose	: 5-10 drops, to remain for 10-30 min.

Brand/Cost

WAXOLVE (Bell)	: Drops: Rs. 5.25 for 10ml
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16.1.6 GLYCERINE ICTHAMMOL

Indication	: Otitis externa
Preparation	: Icthammol: 12.0g Glycerine: 100ml
Dose	: 2-3 drops 3 times daily

16.1.7 BETAMETHASONE

Indication	: Inflammatory conditions
Preparation	: 0.1% sol.
Dose	: 2-3 drops 3 times daily
S.P.	: Viral, fungal or tubercular conditions

Brand/Cost

BETNESOL/EAR (Glaxo)	: Drops: Rs. 4.08 for 3ml
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16.2 NOSE

16.2.1 OXYMETAZOLINE

Indication	: Decongestant
Preparation	: Drops: 0.05%, 0.025%
Dose	: 2 drops, 1-3 times daily
C.I.	: Glaucoma
S.P.	: Hypertension; cardiac disease; hyperthyroidism; rebound congestion.

Brand/Cost

NASIVION (Merck)	: Drops: Rs. 9.27 for 10ml
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NASIVION
PAEDIATRIC : Rs. 8.56 for 10ml
(Merck)

16.2.2 XYLOMETAZOLINE

Indication : Decongestant
Preparation : Drops: 0.1%, 0.05%
Dose : 2 drops 1–3 times daily
C.I. : Glaucoma
S.P. : Hypertension; cardiac disease; hyperthyroidism;
rebound congestion.

Brand/Cost

OTRIVIN : Drops: Rs. 9.13 for 10ml
(Ciba-Geigy)

OTRIVIN-
PAEDIATRIC : Paediatric: Rs. 8.12 for 10ml
(Ciba-Geigy)

16.2.3 CROMOGLYCATE SODIUM

Indication : Allergic rhinitis
Preparation : Drops: 2%
Dose : 2 drops in each nostril,
3 times daily

Brand/Cost

IFIRAL : Nasal spray: Liquid: Rs. 10.51 for 5ml
(Unique)

FINTAL : Nasal Spray: Rs. 54.72 for 17.5ml
(Rallis Fisons)

16.3 OROPHARYNX

16.3.1 MANDL'S PAINT

Indication	:	Symptomatic relief of pharyngitis.
Preparation	:	Iodine: 1.25g Potassium iodide: 2.5g Distilled water 2.5ml Peppermint oil 0.6ml Glycerine to 100ml
Dose	:	To be applied to throat thrice daily

17. EYE

OPHTHALMIC DRUGS

When administered in the form of eye drops or ointments, drugs penetrate the eye ball, probably through the cornea. However, systemic effects, which are usually undesirable may arise from absorption of drugs into the general circulation via conjunctival vessels or from nasal mucose. Eye ointments are often applied to lid margins for blepharitis. They may also be used in the conjunctival sac, for other conditions especially where a prolonged action is required. When two different preparations in the form of eye drops are required at the same time of day, the second drug should be administered few minutes after the first one. It is not advisable for patients to continue to wear hydrophilic (soft) contact lenses when receiving eye drops.

When prescribing antibiotics in general, it is preferable to use topically in the eye drugs that are seldom or never used for systemic infections. However, the possibility of systemic absorption must be taken into consideration. Antibiotics with wide spectrum of activity are chloramphenicol, framycetin, gentamicin, tetracyclin and tobramycin. Preparations containing combination of antibiotics and corticosteroids **should not** be used unless a patient is under close specialist supervision. A red eye is sometimes caused by the herpes simplex virus which produces a dendritic ulcer. Treatment with corticosteroids with or without antibiotics will aggravate the condition with a significant chance of loss of vision or even loss of the eye. These infections can be treated with idoxuridine or acyclovir. For active trachoma, tetracycline eye ointment three times daily for 6 weeks or erythromycin or sulphonamides can be used. For mass anti-trachoma treatment tetracycline hydrochloride eye ointment applied to both eyes twice daily for five days in each month for six months.

In severe infections, systemic antibiotic treatment is given in addition to topical therapy. eg., in gonococcal conjunctivitis in the new born and infective endophthalmitis. Pyrimethamine administered systemically is appropriate for treatment of toxoplasma choroidoretinitis.

Corticosteroids administered topically by subconjunctival injection and systemically are important in the treatment of uveitis and scleritis. "Steroid glaucoma" can occur following topical corticosteroids in patients prone to chronic simple glaucoma. Systemic corticosteroids can be used on an alternate day basis to minimise side effects. The risk of producing steroid cataract is very high if more than 15mg of prednisolone or equivalent is given daily for several years. Oxyphenbutazone eye ointment can be used for episcleritis. Topical preparations containing antihistamines can be used for allergic conjunctivitis.

The two properties of dilatation of the pupil and paralysis of the ciliary muscle are usually possessed equally by anticholinergic drugs applied topically, but they vary in potency. Short acting relatively weak mydriatics which paralyse the sphincter pupillae are used by the ophthalmologists to allow a better view of the fundus of the eye. Relative potencies and duration of action of the drugs of ascending order are tropicamide (3 hrs.) cyclopentolate, hyoscine and homatropine (24 hrs.) and atropine (more than 7 days). Mydriatics may precipitate acute closed angle (congestive) glaucoma in a few patients, usually aged over 60 years who are predisposed to the condition because of a small eye with shallow anterior chamber.

Glaucoma is treated by application of eye drops containing miotics, adrenaline, guanethidine or beta blockers. Acetazolamide and dichlorphenamide is given by mouth, and in emergency or before surgery, mannitol may be given by intravenous infusion. The following drugs produce miosis: carbachol, pilocarpine, and physostigmine sulfate.

17.1 MIOTICS AND ANTIGLAUCOMA DRUGS

12.1.1 PILOCARPINE

Indication	: Glaucoma
Preparation	: Drops: 1%, 2%, 5%
Dose	: 1-2 drops as required.

- C.I. : Acute iridocyclitis
- S.P. : Can cause conjunctivitis on prolonged use.

Brand/Cost

- PILOCAR : Drops: Rs. 6.33 for 5ml vial
- (FDC)

17.1.2 TIMOLOL

- Indication : Glaucoma including open angle and secondary.
- Preparation : Drops: 0.25%, 05%
- Dose : 1 drop of 0.25–0.5% solution TID.
- C.I. : Second and third degree AV heart block, cardiac failure.
- S.P. : Bronchospasm, patient on oral beta blockers, pregnancy.

Brand/Cost

- GLUCOMOL : 0.25% drops: Rs. 14.95 for 5ml
- (Torrent) 0.5% drops: Rs. 27.00 for 5ml

17.1.3 ACETAZOLAMIDE R

- Indication : Adjunct to local applications in glaucoma
- Preparation : Tab: 250mg
- Dose : 250–500mg twice daily
- C.I. : Renal failure or acidosis
- S.E. : Paraesthesia; hypokalemia, loss of appetite; depression
- S.P. : May require potassium supplement

Brand/Cost

DIAMOX : Tab: 250mg: Rs. 5.06 for 10
(Cyanamid)

17.2 ANTI-INFECTIVE DRUGS (TOPICAL)

17.2.1 TETRACYCLINE

Indication : Tetracycline sensitive infections, including trachoma.

Preparation : 2-4 applications daily

Dose : 1% ointment, drops.

C.I. : Hypersensitivity to tetracycline

Brand/Cost

ACHROMYCIN EYE: Oint: 1%: Rs. 1.27 for 3.5g
(Cyanamid) Oil suspension: 1%: Rs. 2.42 for 6ml

ALCYCLIN EYE : Oint: 1%: Rs. 1.45 for 3.5g
(Alembic)

17.2.2 CHLORAMPHENICOL

Indication : Chloramphenicol sensitive infections including trachoma, in cases where tetracycline cannot be used.

Preparation : Oint : 1%
Drops: 0.4%

Dose : 2-4 applications daily

C.I. : Hypersensitivity to chloramphenicol

S.P. : Bone marrow suppression possible

Brand/Cost**CHLOROMYCETIN**

APPLICAPS : Applicaps: 1%: Rs. 9.94 for 50 caps
(Parke Davis)

VANMYCETIN EYE : Drops: Rs. 3.31 for 5ml vial
(FDC)

17.2.3 FRAMYCETIN

Indication : Bacterial blepharitis and conjunctivitis
Preparation : 0.5% ointment
Dose : 2-4 applications daily
C.I. : Hypersensitivity to framycetin

Brand/Cost**SOFRAMYCIN**
(Roussel)

: Ophthalmic oint: 0.5%
Rs. 2.46 for 3g

17.2.4 GENTAMICIN

Indication : Bacterial blepharitis and conjunctivitis
Dose : 2-4 applications daily
C.I. : Hypersensitivity to gentamicin

Brand/Cost**GENTICYN EYE**
DROPS
(Nicholas)

: Drops: 0.3%: Rs. 3.49 for 3ml

17.2.5 IDOXYURIDINE P

Indication : Herpes keratitis
Preparation : Drops: 1%
Dose : 1-2 applications hourly initially then 2-4 hourly

- C.I. : Hypersensitivity
- S.P. : Do not use concurrent steroids. Pregnancy.

Brand/Cost

RIDINOSE : Drops: Rs. 5.20 for 10ml
(Bell)

17.3 ANTI-INFLAMMATORY DRUGS (TOPICAL)

17.3.1 TRIAMCINOLONE P

- Indication : Inflammatory conditions
- Preparation : 1% ointment with gramicidin and neomycin.
0.1% drops & ointment
- Dose : 2-3 applications daily
- C.I. : Viral, fungus or tubercular infection. Glaucoma
- S.P. : Pregnancy; infants

Brand/Cost

KENALOG-S EYE : Oint: Rs. 5.53 for 2.5g
(Sarabhai)

17.3.2 BETAMETHASONE P

- Indication : Inflammatory conditions
- Preparation : 0.1% drops and ointment with neomycin
- Dose : 4-6 hourly applications
- C.I. : Viral, fungal or tubercular infection; glaucoma
- S.P. : Pregnancy; infants

Brand/Cost

BETNESOL-
EYE/EAR : Drops: 0.1%: Rs. 4.08 for 3ml
(Glaxo) Oint : 0.1%: Rs. 3. 41 for 3g.

BETNESOL
N-EYE/EAR : Rs. 3.65 for 3g

17.4 LOCAL ANAESTHETICS

17.4.1 LIGNOCAINE : See 2.2.2

17.5 MYDRIATICS & CYCLOPLEGIC DRUGS

17.5.1 ATROPINE

Indication : For maximal and long acting mydriasis for diagnosis and in uveitis.

Preparation : 1% drops and ointment

Dose : 1-2 drops as needed

C.I. : Narrow angle glaucoma

S.P. : Can precipitate glaucoma in elderly and atropine toxicity in infants.

Brand/Cost

BELLIPINO-ATRIN : Drops: Rs. 4.65 for 5ml
(Bell) Oint : Rs. 3.50 for 3g

17.5.2 HOMATROPINE

Indication : For routine mydriasis

Preparation : 1%, 2% drops

Dose : 1-2 drops as needed

C.I. : Narrow angle glaucoma

S.P. : Can precipitate glaucoma in elderly and atropine toxicity in infants.

Brand/Cost

BELL

HOMATROPINE

EYE (Bell) : Drops: Rs. 4.20 for 10ml

17.5.3 ADRENALINE (Epinephrine)

Indication : For routine mydriasis

Preparation : Drops: 5%, 10%

Dose : 1-2 drops as needed

C.I. : Narrow angle glaucoma

S.P. : Can precipitate glaucoma in elderly.

Brand/Cost

DROSYN EYE : Drops: 5%: Rs. 9.13 for 10ml

DROPS (FDC) Rs. 14.82 for 10ml

17.6 MISCELLANEOUS**17.6.1 HYDROXYPROPYL METHYL CELLULOSE**

Indication : Demulcent, esp., in conjunctivitis sicca.

Preparation : See composition

Dose : 1-2 drops 4 times daily

Brand/Cost

MOISOL EYE

DROPS (FDC) : Drops: Rs. 4.93 for 10ml

17.6.2 CROMOGLYCATE SODIUM

Indication : Allergic conjunctivitis.

Preparation : Drops: 2%

Dose : Needs 4-6 weeks trial to assess efficacy

Brand/Cost

IFIRAL EYE DROPS: Drops: 2%: Rs. 21.00
(Unique) for 10ml vial.

18. MUSCULOSKELETAL SYSTEM: GOUT

18.1 SKELETAL MUSCLE RELAXANTS

Muscle relaxants are of two types. Those used in anaesthesia known as neuromuscular blocking drugs and those used in musculoskeletal disorders.

Anaesthetic relaxants act by specific blockade of the neuro-muscular junction, enabling the employment of light levels of anaesthesia with adequate relaxation of muscles. Their use should always be combined with assisted ventilation until their effect has been antagonised. The non-depolarizing muscle relaxants: Tubocurarine, Pancuronium and Gallamine cause blockade by competitive inhibition of acetyl choline at the receptor site. They have a slower, less complete and longer lasting effect than the depolarising muscle relaxants. Tubocurarine starts to act between 3–5 minutes and lasts for 30 minutes. It may cause a histamine induced rash and be associated with transient hypotension at the onset of blockade. Ether potentiates the effect of Tubocurarine. Pancuronium has a quicker onset of action and does not cause histamine release or significant changes in blood pressure. Gallamine has a more rapid onset of action and recovery than either of the above but causes tachycardia by vagolytic action, and should be avoided in patients with renal disease.

Depolarising muscle relaxants of which suxamethonium is the only commonly used drug have a five minute duration of action. They cause prolonged depolarisation and produce rapid, complete and predictable paralysis with spontaneous recovery. Unlike non-depolarising muscle relaxants, their action cannot be reversed and clinical application is therefore limited to short procedures such as intubation. Paralysis is preceded by muscle fasciculation. There is a transient rise in serum potassium and Creatinine Phosphokinase with post-operative muscle pain. It is contraindicated in liver disease and in burned patients. Premedication with atropine is desirable. Prolonged muscle paralysis occurs in patients with low or atypical plasma pseudocholinesterase and in "dual block" (repeated doses of suxamethonium causes development of non-depolarising block, following the primary depolarising block).

Artificial ventilation should be continued until muscle function is restored.

Muscle relaxants used in spasticity act principally on the central nervous system with the exception of Dantrolene which has a direct intra-cellular muscle effect.

The underlying cause of spasticity should be treated and any aggravating factors remedied. The major disadvantage in their use is that reduction of muscle tone can cause a loss of splinting action of the spastic leg and trunk muscles, leading to increased disability. Diazepam and baclofen have similar clinical effects and may cause sedation and hypotonia. Dantrolene produces fewer central adverse effects making it a drug of choice. Doses should be increased slowly.

18.1 MUSCLE RELAXANTS (Peripherally acting) AND CHOLINESTERASE INHIBITORS

18.1.1 GALLAMINE R

- Indication : Medium duration of muscle relaxation (non-depolarising). (More rapid onset of action and recovery than Tubocurarine or Pancuronium).
- Preparation/Dose : Inj : 4% in 2ml amp.
Dose: 80–120mg I.V. Initially and
20–40mg supplements.
Child: 1.5mg/kg.
- S.E. : Undesirable tachycardia.
- S.P : Avoid in patients with severe renal disease as it is excreted by kidneys.

Brand/Cost

- FLAXEDIL : Inj : 2ml amp: Rs. 40.84 for 10 amp.
(M & B)

18.1.2 PANCURONIUM BROMIDE R

- Indication : Non-depolarising muscle relaxant of medium duration (quicker onset of action and not much change in BP)
- Preparation/Dose : Inj : 2mg/2ml
Dose: Initially for intubation, 50–100 micrograms/kg, then 10–20 microgram/kg as required.
Child: initially 60–100 microgram/kg, then 10–20 microgram/kg.
Neonate 30–40 microgram/kg, then 10–20 microgram/kg.
- C.I. : Myasthenia gravis
- S.P. : Where tachycardia may be dangerous. Reduce dose in obesity and renal failure.

Brand/Cost

- PAVULON : Inj : 2mg/2ml: Rs. 15.35 pr amp.
(Infar)

18.1.3 TUBOCURARINE

- Indication : Non-depolarising muscle relaxant of medium to long duration
- Preparation/Dose : Inj : 10mg/ml
Dose: 15–30mg, IV initially and 5–10mg supplements.
- S.E. : May cause erythematous rash on chest and neck
- S.P. : Onset of blockade may be associated with hypotension.
- C.I. : Myasthenia gravis.

Brand/Cost

TUBARINE
(Burroughs
Wellcome)

: Inj : 10mg/ml: Rs. 57.72 for 5ml vial.

18.1.4 SUXAMETHONIUM CHLORIDE (SUCCINYL CHOLINE)

Indication : Depolarising muscle relaxant of short duration.

Preparation/Dose : Inj : 50mg/ml — 10ml vial.

S.E. : Prolonged muscle paralysis may occur in patients with low or atypical plasma pseudocholinesterase enzyme and in dual block.

Brand/Cost

MIDARINE
(Burroughs
Wellcome)

: Inj : 50mg/ml: Rs. 6.99 for 10ml vial.

SCOLINE
(Glaxo)

: Inj : 50mg/ml: Rs. 7.82 for 10 ml.

18.1.5 NEOSTIGMINE : See also 5.2.5

Indication : For reversing the effect of non-depolarising muscle relaxant such as tubocurarine. Poisoning with atropine, hyoscine or datura. Myasthenia gravis.

Preparation/Dose : Tab : 15mg
Inj : amp: 0.5mg/ml; vial: 2.5mg/ml — 5ml vial
Acts within one minute of IV injection and lasts 20–30 min. Dose: 1mg/20kg body weight.

S.P. : Atropine should be given before or with neostigmine to prevent bradycardia. Excessive salivation and other muscarinic actions. Cholinergic crisis.

Brand/Cost

PROSTIGMIN : Inj : Rs. 122.18 for 50 amp.
(Roche) Tab : 15mg: Rs. 34.41 for 20 tab.

18.2 DRUGS USED IN GOUT**18.2.1 ALLOPURINOL H**

Indication : Gout; secondary hyperuricaemia

Preparation/Dose : Tab : 100mg
Dose: Initially 100mg daily as a single dose after food; gradually increased over 1–3 weeks, to about 300mg daily. Maintenance dose: 200–600mg (according to plasma uric acid level).

S.E. : Rashes, sometimes with fever; gastro-intestinal upset. Rarely malaise, headache, vertigo, drowsiness, taste disturbance, hypertension, alopecia, hepato-toxicity.

C.I. : Acute gout.

Brand/Cost

ZYLORIC : Tab : 100mg: Rs. 5.84 for 10
(Burroughs Wellcome)

18.2.2 COLCHICINE R P L

Indication : Gout

Preparation/Dose : Tab : 0.5mg
Dose: 1mg initially, then 0.5mg every 2–3 hours until relief of pain or vomiting or diarrhoea or until a total dose of 10mg reached.

S.E. : Nausea, vomiting, abdominal pain, diarrhoea, gastro-intestinal haemorrhage, rashes, renal

damage, peripheral neuritis, alopecia, blood disorders.

S.P. : Elderly; cardiac or gastrointestinal disease; renal impairment; pregnancy; breast feeding.

Brand/Cost

COLCHINDON : Tab : 0.5mg: Rs. 6.00 for 30
(Indon Pharma)

18.2.3 PROBENECID H

Indication : Gout

Preparation/Dose : Tab : 500mg
Dose: Uricosuric treatment:
250mg b.d. after food,
increased after a week to 500mg b.d. then up to
2g daily in 2-3 divided doses and according to
plasma uric acid level.
To achieve penicillin and cephalosporin blood
levels: 1g at same time as oral penicillin or
cephalosporin or 30 min. before an I.M. injection.

S.E. : Nausea, vomiting, urinary frequency, headache,
flushing, rashes, hypersensitivity, nephrotic
syndrome, aplastic anaemia, hepatic necrosis.

C.I. : Acute gout, nephrolithiasis, concurrent, salicylate
treatment, blood disorders.

Brand/Cost

BENEMIO : Tab : 500mg: Rs. 17.00 for 20
(Merind)

19. OBSTETRICS

19.1 OXYTOCICS

Myometrial stimulants are used to induce abortion, induce or augment labour and to minimise blood loss from the placental site. They include oxytocin, ergometrine and prostaglandin.

Extra or intra amniotic administration of prostaglandin can be used for induction of late therapeutic abortion i.e., after 14 – 16 weeks gestation. They are contraindicated in conditions where prolonged uterine contractions would be inappropriate.

Oxytocin is administered by slow intravenous infusion to induce or augment labour, often in conjunction with amniotomy. Uterine activity must be monitored and hyperstimulation should be avoided. It should be used with caution, in multiple pregnancy, grand multipara, previous caesarean section and hypertension. Prostaglandins in the form of vaginal tablets and gels can also be used for induction of labour. Intravenous and oral routes of prostaglandins are not used.

Bleeding due to incomplete abortion can be controlled with ergometrine and oxytocin, given intravenously or intramuscularly. For routine management of the third stage of labour, ergometrine is given by intramuscular injection after the delivery of the shoulders. Intravenous injection is needed for prevention of post-partum haemorrhage in high risk cases. Ergometrine should not be given during first and second stage of labour and in patients with heart disease and hypertension.

19.1.1 METHYLERGONOVINE MALEATE

Indication : Active management of third stage of labour. Post partum haemorrhage, subinvolution of puerperal uterus.

Preparation/Dose : Inj : 0.2mg/ml
Dose: 0.2mg IV or IM
Tab : 0.25mg — 0.5mg TID

- S.E. : Nausea, vomiting, transient hypertension, vasoconstriction.
- C.I. : 1st and second stages of labour. Obliterative vascular disease. Impaired hepatic and renal function.
- S.P. : Toxaemia, cardiac disease, hypertension, sepsis, multiple pregnancy.

Brand/Cost

- METHERGIN : Inj : 0.2mg/ml: Rs. 11.95 for 6 amps.
(Sandoz) Tab : 0.125mg: Rs. 9.56 for 15

19.1.2 OXYTOCIN

- Indication : Induction and augmentation of labour; management of missed or incomplete abortion; post partum haemorrhage.
- Preparation/Dose : Inj : 5U/ml, 2U/ml
Dose: by slow I.V. infusion as a solution containing 1 unit/litre, 1–3 milliunits/min., adjusted according to response.
P.P.H. — 5–10 units/500ml given at a rate of 15 drops/min.
- S.E. : High doses cause violent uterine contraction leading to rupture and foetal asphyxia. Arrhythmia, maternal hypertension. Subarachnoid haemorrhage. Water intoxication.
- S.P. : Hypertension, multiple pregnancy; high parity, previous caesarian section.
- C.I. : Hypertonic uterine inertia. Mechanical obstruction to delivery. Foiled trial labour. Severe toxaemia. Predisposition to amniotic fluid embolism; foetal distress; placenta praevia.

Brand/Cost

PITOCIN : Inj : 10 I.U./ml, 0.5ml amp: Rs. 6.72 for 6 amp
(P.D. & Co)

SYNTOCINON : Inj : 5 I.U./ml: Rs. 6.72 for 6 amp
(Sandoz)

19.2 MAGNESIUM SULPHATE R

Indication : Eclampsia

Preparation/Dose : 25% amp.

Brand : Rs. 7.74 for 50 amps
(Sterling Pharma)

20. RESPIRATORY TRACT, DRUGS ACTING ON THE

20.1 OXYGEN

20.2 ANTI-ASTHMATIC DRUGS

The goals of anti asthmatic therapy are rapid reversal of bronchospasm and prevention of respiratory failure. Mild to moderate attacks respond to aerosol administration of a selective beta-adrenoceptor stimulant such as salbutamol or terbutaline. In frequently occurring moderate asthma, the introduction of sodium cromoglycate, theophylline or corticosteroid aerosol, inhalation may stabilise the asthma and avoid the use of oral corticosteroids. However, in most severe attacks a short course of an oral corticosteroid may be necessary to bring the asthma under control. Treatment of patients with severe airways obstruction or status asthmaticus is safer in hospital where oxygen and resuscitation facilities are immediately available. Many patients with chronic bronchitis and emphysema are generally considered to have irreversible airway obstruction, but they nevertheless often respond partially to the beta-adrenoceptor stimulant drugs. Acute exacerbations of chronic asthma is usually due to secondary infections and should be treated with antibiotics along with anti-asthmatics.

20.2.1 ADRENALINE (Epinephrine)

Indication : Acute asthma
Acute allergic and anaphylactic reactions

S.E./S.P./C.I. : As under 4.3.1

Brand/Cost

ADRENALIN

(Bengal Immunity) : See under 4.3.1

20.2.2 AMINOPHYLLINE H L DI

Indication : Reversible airways obstruction. Left ventricular failure. Status asthmaticus.

Preparation/Dose : Tab : 100mg
 Dose: 100-300mg, 3-4 times daily.
 Inj : 2.5% — 10ml amp. (250mg/10ml)
 by slow I.V. 250-500mg (5mg/kg) over 20 min.
 Maintenance: 5mg/kg/hr by slow infusion.
 Child: 15-20mg/kg/day and 8 hr. orally.
 I.V. 5-7mg/kg dose followed by 0.9mg/kg/hr.

S.E. : Tachycardia, palpitations, nausea, gastro-intestinal disturbances, insomnia, arrhythmias, convulsions, esp., if given rapidly.

S.P. : Dose in liver disease; epilepsy, cardiac disease, breast feeding, elderly patients, fever.

Brand/Cost

AMINOPHYLLINE : Inj : 250mg, 10ml amp: Rs. 7.73 for 5 amps
 (B.W.) Tab : 100mg: Rs. 2.00 for 25

20.2.3 DERIPHYLLIN (Etophyllin & Theophylline) D I H L

Indication : Reversible airways obstruction

Preparation/Dose : Tab : 100mg 1-3 TID
 300mg (Retard) 1 TID
 Inj : 220mg/2ml.
 Syrup: 60mg/5ml
 Child : 20-25mg/kg/day Q8h oral

S.E./S.P./C.I. : See 20.2.2

Brand/Cost

DERIPHYLLIN : Inj : Rs. 47.68 for 50 amps.
 (German Remedies) Syrup: Rs. 4.26 for 100ml
 Tab : Rs. 15.66 for 150

DERIPHYLLIN

RETARD : Tab : Rs. 14.91 for 60

20.2.4 ORCIPRENALINE

- Indication : Reversible airways obstruction.
- Preparation/Dose : Tab : 10mg, 20mg
Syrup: 10mg/5ml
Inj : 0.5mg/ml — 1ml amp.
Dose : 1–2 tabs 3–4 times daily
Child : 1 tab TID
Syrup: 5–10ml
Child : 5ml
Inj : 1–2 amp. IM or slow I.V.
Child : ½ — 1 amp
- S.E. : As under Salbutamol

Brand/Cost

- ALUPENT : Inj : 0.5mg/ml: Rs. 13.06 for 10 amp.
(German Remedies) Syrup: 10mg/5ml: Rs. 23.58 for 120 ml
Tab : Rs. 33.90 for 100

20.2.5 TERBUTALINE SULPHATE

- Indication : Reversible airways obstruction, severe acute asthma. By I.V. continuous infusion 3–5 microgram/ml. 1.5–5 microgram/min. for 8–10 hours. Reduce dose for children.
- Prep/Dose : Tab : 2.5mg & 5mg
Inj : 0.5mg/ml — 5ml amp.
Inhaler: 250mg/metered dose.
- Dose : 2.5–5mg, 8 hourly orally.
Child : 0.1mg/kg/day Q8th orally.
By subcutaneous IM or slow IV injection 250–500 microgram upto 4 times daily.
- Child : 2–15 years: 10 microgram/kg to a max. of 300 microgram.

Inhaler 1-2 puffs, 3-4 times daily max. 24 puffs in 24 hours.

Severe acute asthma: Reduce dose for children.

S.E. : As under Salbutamol

Brand/Cost

BRICANYL : Inj : 0.5mg/ml: Rs. 11.26 for 5 amp.
(Astra/IDL) Tab : 2.5mg: Rs. 3.06 for 12
5mg: Rs. 4.70 for 12
Syrup : 3mg/5ml: Rs. 5.00/60ml
Inhaler: 250 micrograms per dose; 200 dose unit
Rs. 32.00

TERBUTALINE : Tab : 2.5mg: Rs. 2.40 for 10
(Cipla) 5mg: Rs. 3.70 for 10
Syrup: 1.5mg/5ml: 8.00 for 112ml

20.2.6 SALBUTAMOL P

Indication : Reversible airways obstruction. Severe acute asthma.

Route/Prep/Dose : Tab : 2mg, 4mg, 8mg (SA)
Syrup : 2mg/5ml
Inhaler: 100 microgram/dose
Dose : 2-4mg 3-4 times daily
Child : 10-100 micrograms/kg/dose Q8h oral
Inhaler: 1-2 puffs, 3-4 times daily
Child : 1 puff, 3-4 times daily
Max. 8 puffs/day.

Inj : S.C or IM 500 microgram repeated every 4 hours if necessary. Slow I.V. 250 microgram, repeated if necessary.

Child: 4-6 micrograms/kg/dose, SC, IM or slow IV every 6-8 hours. I.V. infusion: initially 5 micrograms/min. adjusted according to response usually in range 3-20 microgram/min.

S.E. : Fine tremor (hands); nervous tension; headache; peripheral vasodilation; tachycardia; hypokalaemia (after high doses). Slight pain on IM injection.

S.P. : Hyperthyroidism; ischaemic heart disease; hypertension; pregnancy; elderly patients. I.V. administration to diabetics: monitor blood glucose.

Brand/Cost

ASTHALIN
(Cipla)

: Inj : 250 micrograms/5ml: Rs. 13.15 for 5 amp. .
Tab : 2mg: Rs. 3.41 for 10
4mg: Rs. 5.16 for 10
Syrup : 2mg/5ml: Rs. 5.16 for 10
Inhaler: 100 microgram: Rs. 25.25 for 200 metered doses.

BRONKOTAB : Tab : 2mg: Rs. 13.30 for 100
(Biddle Sawyer) : Syrup: 2mg/5ml: Rs. 8.06 for 120ml

20.2.7 BECLOMETHASONE

Indication : Chronic airways obstruction, especially when not controlled by bronchodilators and requiring steroids.

Route/Prep/Dose : Inhaler: 50 microgram per dose of aerosol.
Dose : 2 inhalations TID upto maximum of 20 inhalation a day
Child : 1 inhalation TID upto maximum of 10 a day.

S.E. : Hoarseness of voice. Candidiasis of mouth or throat (rinsing of mouth with water after inhalation may help).

S.P. : Respiratory infections. Active or quiescent tuberculosis of lung.

Brand/Cost

BECLATE

INHALER (Cipla) : 50 micrograms: Rs. 45.00 for 200 metered doses.
Nasal spray: 50 micrograms: Rs. 51.95 for 200 metered doses.

20.2.8 SODIUM CROMOGLYCATE

Indication : Prophylaxis of bronchial asthma.

Route/Prep/Dose : 20mg/cartridge (spin cap)
20 cartridges with inhaler.

Dose: 1 spin cap 4 times daily; in severe case up to 8 times daily for 4–6 weeks.
Continue at reduced dose if beneficial.
Aerosol inhaler.

S.E. : Coughing; transient bronchospasm and throat irritation due to inhalation of powder (using Salbutamol inhaler few minutes before may help).

Brand/Cost

IFIRAL : Inhaler: Rs. 14.83 for 20 cartons
(Unique) Nasal spray: Rs. 10.51 for 5ml

FINTAL : Rs. 78.89 for 120 metered doses.
(Rallis Fison)

20.3 ANTITUSSIVES

Anti-tussives are drugs used for symptomatic relief of cough. They are **NOT** substitutes for the specific therapy of the underlying pathological condition. These are pharyngeal demulcents, expectorants and cough suppressants.

Pharyngeal demulcents are administered in the form of lozenges, troches, cough drops or linctuses. These are mainly used to relieve dry irritating cough. **Expectorants** are useful in the therapy of chronic cough.

due to irritation of respiratory mucosa and in conditions where secretion is thick and viscid, needing liquefaction, as in bronchial asthma, chronic bronchitis and emphysema. Potassium iodide, ammonium chloride and ipecacuanha are the commonly used expectorants. Compound cough preparations are not of much use, because many of these contain an unnecessarily large number of ingredients, often in sub-therapeutic doses, and with opposing effects. It is therefore best to prescribe one of the simple cough mixtures and if any other component is needed, it may be then prescribed separately, tailored to the needs of the patient and dosage adjusted accordingly.

Cough suppressants are mainly useful in symptomatic relief of dry irritant type of cough. They cause sputum retention which may be harmful in patients with chronic bronchitis and bronchiectasis. The commonly used cough suppressants are codeine, dextromethorphan, noscapine, pholcodine and anti histamines such as diphenhydramine, dimenhydrinate etc. Morphine and methadone are effective cough suppressants and are given in linctuses to control distressful cough in terminal lung cancer. In other circumstances they are contraindicated because they induce sputum retention and ventilatory failure as well as causing narcotic dependence. Cough suppressants containing codeine or similar narcotic analgesics are not recommended in children and should be avoided altogether in those under one year of age. Most anti-tussives contain compounds that will enhance the CNS depressant action of other concomitantly administered drugs.

20.3.1 COUGH SUPPRESANTS

- Indication : For sleep disturbed by dry or painful cough
- Route/Prep/Dose : For composition and dose consult instructions on brands.
- S.E. : May cause sputum retention and this may be harmful in patients with chronic bronchitis and bronchiectasis.
Constipation. Codeine or similar opioid

containing preparations generally not recommended in children. Avoid in those below 1 year of age.

Brand/Cost

LINCTUS

CODEINE (Astra) : Dose: 2-5ml tid. Rs. 9.00 for 40ml

TIXYLIX LINCTUS : Rs. 6.75 for 125ml
(M & B)

PHENSEDYL : Liquid: Rs. 8.24 for 125ml
(M & B)

COSCOPIN

LINCTUS : Rs. 6.44 for 100ml
(Biological-E)

20.3.2 COUGH EXPECTORANTS AND DEMULCENTS

20.3.2.1. AMMONIUM CHLORIDE AND IPECACUANHA MIXTURE

Ammoniam bicarbonate	:	200mg
Ipecacuanha tincture	:	0.3ml
Conc. anise water	:	0.05ml
Conc. Camphor water	:	0.1ml.
Liquonice liquid extract	:	0.5ml
Chloroform water, double strength	:	5ml
Water for preparation to	:	10ml

20.4 RESPIRATORY STIMULANTS (Analeptic Drugs)

Indication	:	(Limited use)
		In chronic obstructive pulmonary disease when patient is drowsy may arouse him sufficiently to cooperate with physiotherapy and clearing of secretions.

20.4.1 DOXAPRAM HCl DI

Indication	:	Acute respiratory failure (See notes on above) Post anaesthesia drug induced
Prep/Route/ Dose	:	Inj: 20mg/ml — 5 ml vial Dose: 0.5–2.0 mg/kg I.V.
S.P.	:	Concurrent treatment with mono-amine oxidase inhibitor; incompatible with aminophylline, frusemide; thiopentone sodium and other alkaline solutions.
C.I.	:	Epilepsy and other convulsive disorders; severe hypertension; hyperthyroidism; status asthmaticus; coronary artery disease.

Brand/Cost

DOPRAM :
(Khandelwal)

Inj: 20 mg/ml: Rs. 20.76 / 5ml.

21. SOLUTIONS CORRECTING WATER, ELECTROLYTE, ACID-BASE AND CALORIC DISTURBANCES.

21.1 ORAL

21.1.1 ORS : See

21.1.1. GLUCOSE (DEXTROSE)

Indication : Hypoglycaemia; calorie support

Preparation : Powder

21.1.3 POTASSIUM CHLORIDE

Indication : Potassium supplementation for hypokalaemia (e.g., diuretic treatment); during treatment for keto-acidosis

Preparation : Syrup: 3g/30 ml

Brand

POTKLOR : Rs. 15.05 for 210ml
(Martin & Harris)

21.2 PARENTERAL

21.2.1 AMINO ACID SOLUTION

Indication : Parenteral nutrition

Preparation, etc : See product literature

Brand

ASTYMEN

HERMIN

AMINO

PLASMAL-L5

21.2.2 CALCIUM GLUCONATE

21.2.3 DEXTROSE SOLUTIONS

Dextrose 5%, 10% : 500ml
Dextrose 25%, 50% : 25ml

21.2.4 SODIUM CHLORIDE

Normal Saline, 0.9% : 500ml
Hypertonic, 4% : 25ml
Half normal saline : 500ml

21.2.5 DEXTROSE — SALINE SOLUTION

D₅/0.9 NS : 500ml
D₅/0.45 NS : 500ml
D₅/0.2 NS : 500ml

21.2.6 FAT EMULSION

Indication : Parenteral nutrition
Preparation, etc. : See product literature

Brand

INTRALIPID

LIPOFUNDIN

21.2.7 MAGNESIUM SULPHATE : (See 19.2)

Indication : Eclampsia
Preparation : 50%, 2 amp.

21.2.8 POTASSIUM CHLORIDE

Indication : Electrolyte imbalance

- Preparation : Inj, 15%, 2 meq/ml, 10 ml amp.
- S.P. : Must always be diluted and given as an infusion.
Avoid rates more than 10 meq/hour. Rapid
injection may be toxic to the heart.

21.2.9 RINGER LACTATE

- Indication : Electrolyte imbalance
- Preparation : 500ml

21.2.10 SODIUM BICARBONATE

- Indication : Metabolic acidosis
- Preparation : Inj: 7.5% 10ml amp., 25 ml amp.,
- S.P. : Avoid mixing with dopamine or calcium
containing solution

21.2.11 Water for injection

22. IMMUNOLOGICALS IMMUNOLOGICAL PRODUCTS AND VACCINES

Vaccines are designed to produce specific protection against a given disease. They may be live attenuated (BCG, rubella, measles), inactivated preparations of virus (influenza) or bacteria (typhoid) or detoxified exotoxins (tetanus toxoid). Live attenuated vaccines generally achieve protection with a single dose but three doses are required in the case of oral polio vaccine, Inactivated vaccines usually require a primary series of doses to produce an adequate antibody response followed by a booster injection.

Some vaccines (e.g., OPV) produce very few reactions while others (e.g., measles or rubella) may produce a very mild form of the disease. Live virus vaccines should never be routinely administered to pregnant women (because of possible harm to the fetus), individuals with impaired immunity and those suffering from malignant conditions.

Immunity with immediate protection against certain infective organisms can be obtained by injecting preparations made from the plasma of immune individuals (passive immunity). Antibodies of human origin are usually termed "immunoglobulins" while "antiserum" (e.g., anti-tetanus serum) is applied to material prepared in animals. Serum sickness and other allergic-type reactions may follow injections of anti-sera limiting the usefulness of these products. This therapy has been replaced wherever possible by the use of immunoglobulins. Human immunoglobulins are of two types — normal immunoglobulin (gammaglobulin) prepared from pools of at least 1000 donations of human plasma and specific immunoglobulins which are prepared by pooling the blood of convalescent patients or of immunised donors who have recently been specifically boosted. Gammaglobulin can be administered for the protection of susceptible contacts against hepatitis A, measles and rubella.

Examples of specific immunoglobulins are anti-tetanus immunoglobulin, anti-hepatitis B immunoglobulin and anti-rabies immunoglobulin.

Refrigerated storage of vaccines and immunological products is usually required at a temp. of 2° — 8° C. Opened multi dose vials which have not been fully used should be discarded within one hour if no preservative is present (most live virus vaccines) or within 3 hours (when vaccines containing a preservative are used). Ampoules should always be adequately shaken before use to ensure uniformity of the material to be injected.

22.1 DIAGNOSTIC AGENTS

22.1.1 TUBERCULIN

PURIFIED PROTEIN DERIVATIVE (PPD)

Indication : As an aid to diagnosis of tuberculosis.

Route/Prep/Dose : Mantoux test
Test dose 10 units/0.1ml by intradermal injection on flexor aspect of forearm. Result read 48-72 hours after injection. Positive — diameter of induration measuring 10mm or more —measured transversely to long axis of forearm. If negative may repeat using second strength PPD (100-250 tuberculin units)

10 TU/0.1ml — 5ml vials

5 TU/0.1ml — 5ml vials

S.P. : False negative:
1. Subcutaneous
2. Loss of potency of PPD
3. Errors in dilution
4. Prolonged exposure of PPD to heat or light.
5. Bacterial contamination of PPD solution.

Reactivity may be depressed or suppressed due to:

- viral infection
- live virus vaccines
- administration of corticosteroids
- malnutrition
- immune suppressed host.

Positive reaction does not necessarily signify the presence of active disease. Distinction between clinical and dormant infection is made only on clinical, bacteriological and radiological criteria.

Brand/Cost

TUBERCULIN PPD : 10 TU/0.1ml: Rs. 38.00 per 5ml
(Span Diagnostics)

Government Health
Services

22.2 SERA AND IMMUNOGLOBULINS

ALL PLASMA FRACTIONS SHOULD COMPLY WITH THE GOVERNMENT AND WHO REGULATIONS FOR COLLECTION, PROCESSING AND QUALITY CONTROL OF HUMAN BLOOD AND BLOOD PRODUCTS — INCLUDING IMMUNOGLOBULINS.

22.2.1 ANTI-D-IMMUNOGLOBULIN

- Indication : To prevent a Rhesus negative mother from forming antibodies to foetal Rhesus positive cells, to protect any further child from haemolytic disease.
- Route/Prep/Dose : Dose for Rh negative: 250–500 units IM within 72 hours of birth or abortion of a Rh positive infant. After transfusion up to 5000 units IM.

22.2.2 ANTI DIPHTHERITIC SERUM (ADS)

- Indication** : Prophylaxis of schick positive individuals in close contact with diphtheria patient.
Treatment of diphtheria.
- Route/Prep/Dose** : Anti-toxin globulin derived from horse serum actively immunized against with diphtheria.
10,000 IU in ampoules. 20,000 IU in ampoules.
Dose: Prophylaxis 4000, 10,000 IU IM. Dose same for children and adults.
Treatment: Mild nasal/pharyngeal diphtheria: 40,000 IU IV. Moderately severe diphtheria: 80,000 IU IV.
Severe pharyngeal/laryngeal infection more than 48 hours Brawny oedema of neck: 120000 I.U. IV
- S.E.** : Anaphylactic shock; urticaria; serum sickness may occur after 2-3 weeks.
- S.P.** : Intradermal skin test to be done: 0.02ml of 1:100 solution I.D.
Wheal in ½ hr indicates sensitivity
Eye test: one drop of 1:1000 dilution in normal saline applied to eye.
Lacrimation, redness in ½ hr. indicated sensitivity.
- Brand/Cost (HAFFKINE)** : 10,000 IU — 5ml amp: Rs. 207.10
10ml amp: Rs. 207.10
- Desensitisation if patient is sensitive to horse serum but administration is absolutely necessary.
- Inj** : S.C. or IM at 15 min interval
0.05ml of 1:20 dilution S.C.
0.1ml of 1:10 dilution S.C.

0.2ml of 1:10 dilution SC
0.1ml of undiluted S.C.
0.2ml of undiluted IM
0.5ml of undiluted IM

Then total dose may be given. Keep adrenaline and antihistamine ampoules at hand during therapy.

IM dose always to precede IV dose. Total dose to be given as a single injection to reduce risk of sensitisation. Active immunisation to be initiated simultaneously as period of protection is short (2 – 4 weeks).

22.2.3 ANTI RABIES SERUM (ARS)

Indication : Post exposure treatment of severe (Type III) animal bites.

Preparation : Animal serum containing globulins with specific power of neutralising rabies virus. Has 80 units/ml of serum; 1 vial has 1000 units.

Dose: If less than 48 hours after bite, 1000 units/25kg body weight partly around the wound and partly IM.

If above 72 hours since bite, 2000 units/25kg body weight partly around wound and partly IM.

S.P./S.E. : As for ADS

22.2.4 ANTI-VENOM SERA

Indication : Acute poisoning due to bite by venomous snakes.

Brand/Cost
(HAFFKINE) : Refer product literature.
Inj : 10ml vial: Rs. 124.60

22.2.5 IMMUNOGLOBULIN (Gamma Globulin Human Normal Immunoglobulin)

- Indication : Management of hypogamma globulinaemias. Protection of susceptible contacts against hepatitis A, measles and, to a lesser extent, Rubella.
- Preparation : 16.5% W/V 1ml & 2ml amps.
Dose: 0.02ml/kg dose in children (average). Dose varies with indication (see literature).

22.2.6 TETANUS ANTITOXIN (TAT)

- Indication : Treatment of tetanus. Prophylaxis against tetanus in people under risk (not actively immunised earlier). eg., road accident victims with open wounds.
- Preparation : Anti-toxin globulin derived from horse serum.
Ampoule — 750 IU.: 1500 I.U.; 10,000 I.U.; 20,000 I.U.; 50,000 I.U.
Dose: Treatment — single dose 50,000 to 1,00,000 half IM, half IV.
Prophylaxis 3000–5000 I.U. IM
- S.P./S.E. : As for ADS

Brand/Cost

- (HAFFKINE) : Inj : (Prophylactic): I.U. 1500: Rs. 7.75/ml
(Serum Institute) : Inj : (Therapeutic): I.U. 10,000: Rs. 47.50 for 3.4ml amp.

22.2.7 TETANUS IMMUNE GLOBULIN

- Indication : As for TAT

Preparation : Standardised solution of gamma globulin from human plasma with an increased titre of tetanus antitoxin.

IMMUNISATION:

1. Immunise all children in the first year of life.
2. Inform parents that the child must be taken 5 times during the first year of life.
Complete the full course; otherwise, there will not be enough protection.
3. It is safe to immunise a child who is suffering from a minor illness (such as moderate fever, cough, cold, diarrhoea or malnutrition).

Contra-indications: There are very few contra-indications:

1. If the child had a severe reaction to DPT, then the child should be given only DT the next time.
2. If the child is over 6 months and has high fever, wait till the child had 3 or 4 doses of oral polio vaccine.
3. If there are many cases of polio in the community, intramuscular injections, including DPT, should not be given.

COLD CHAIN

Immunization can be successful only if the vaccines retain their potency. This requires storage and transport at low temperatures at every stage. The **Cold Chain** ensures this from the place of manufacture till the use of the vaccine.

Recommended temperature for storage of vaccines

Vaccine	Temperature	Potency maintained for	Remarks
1. Oral Polio (OPV)	- 20°C	1 year	Avoid repeated thawing
	4°C - 8°C	3 months	Keep on ice while using
2. Bacillus Calmette-Guerin (BCG)	4°C - 8°C	1 year	After opening the vial, use within 3 hours
3. Diphtheria, Pertussis Tetanus (DPT-Triple antigen)	4°C - 8°C	24 months	must not be frozen
4. Diphtheria, Tetanus (DT-Dual antigen)	4°C - 8°C	24 months	must not be frozen
5. Measles	0°C - 2°C	24 months	
6. Typhoid (TAB)	4°C - 8°C	8 months	must not be frozen
7. Tetanus Toxoid (TT)	4°C - 8°C	18 months	must not be frozen

Diluent fluids are kept in the refrigerator, if space permits.

Cold Chain: Manufacture → Airport → State → District store → Hospital/Health Centre → Outreach.

Equipment for transport

Thermocol box/Thermosflask

Should be wide-mouthed. Keep ice in polythene bags within. Avoid DPT/TT/TAB vaccine coming under direct freezing contact.

Cold box/Vaccine carriers

Insulated boxes with solid frozen ice packs. They have separate chambers for the different vaccines, suitable for transport of large quantities of vaccines.

Refrigerators

Maintain the refrigerator in good working order. Use voltage stabilisers. Keep the refrigerator in a cool room, atleast six inches from the wall. Connect with a generator, if there is frequent or long hours of power failure.

Vaccine storage in the refrigerator

Do not keep vaccines in the door panel.

DPT/DT/Typhoid vaccines should not be kept in the freezer compartment. Keep them in the lower compartments.

OPV vial in current use should be kept in the freezer compartment or the compartment next to it.

BCG and Measles vaccines are kept in the freezer compartment or next to it.

When defrosting the refrigerator, keep vaccines in thermocol box or vaccine carrier, containing ice packs.

Keep only minimum stock (not more than one month's requirement) in the refrigerator.

Single dose vials are preferred.

During vaccination session, if it is of long duration, vials of vaccine taken out of refrigerator should be kept in a cup containing ice.

Always protect the vaccine from heat and light.

IMMUNISATION SCHEDULE

	When	Vaccine	Number	Route	Interval
Prenatal	16 — 36 weeks	TT	2*	IM	First at 16 weeks; second at 20 weeks
Children	0 — 3 months	BCG**	1	ID	
	3 — 9 months	DPT	3	IM	4 — 6 weeks
	3 — 9 months	OPV	3 ^o	Oral	4 — 6 weeks
	9 — 12 months	Measles	1	Sc	
	16 — 24 months	DPT booster	1	IM	
		OPV booster	1	Oral	
	4 — 5 yrs	DT	1	IM	
		OPV	1	Oral	
		TAB	2	IM	1 — 2 months
	10 years	TT booster	1	IM	
		TAB booster	1	IM	
	16 years	TT booster	1	IM	
		TAB booster	1	IM	

* One booster, if 2 doses had been given less than 3 years ago,

** In case of institutional deliveries, BCG is given at birth.

^o 5 doses are preferred.

VACCINES

22.3.1 FOR UNIVERSAL IMMUNISATION

22.3.1.1. BCG VACCINE P

Indication	: Primary immunisation BCG testing
Preparation	: Live attenuated bovine M. tuberculosis, freeze dried. Dose: 0.05ml in neonates; 0.1 ml in older children. Intradermal using tuberculin syringe. Other techniques: multipuncture dermojet, scarification.
S.E.	: Penetration into SC tissue may cause local abscess. Axillary lymphadenitis, rarely tuberculous, periostitis, disseminated tuberculosis.
C.I.	: Immune deficiency states; febrile illness; pregnancy.
S.P.	: To be refrigerated. Can be stored at room temperature for 2-4 weeks only. To be used within 3 hours of reconstitution with saline (not distilled water). Government Supply

22.3.1.2 DIPHTHERIA-PERTUSIS-TETANUS VACCINE (DPT)

Indication	: Routine immunization (see immunisation schedule).
Preparation/Dose	: Dose: 0.5ml deep IM
S.E.	: Local pain and induration; fever; fretfulness; convulsions; collapse rarely.

C.I. : Acute febrile illness; history of convulsions, urticaria, eczema, CNS disease in the child. Steroid therapy.

S.P. : Store at 2° — 8°C
Do not freeze.
Shake ampoule vigorously before use.

Brand/Cost

(Serum Institute) : Rs. 18.80 for 10 amps.
(Glaxo) : Rs. 18.80 for 10 amps

22.3.1.3 DIPHTHERIA-TETANUS (DT) VACCINE

Indication : Routine immunisation for children with history of convulsions, family history of convulsions or CNS disease where DPT is contra-indicated.

Preparation/Dose : 0.5ml IM. 1 vial of 10 doses.

S.P. : Mild pain; febrile reaction

S.P. : Store between 4—8°C

C.I. : Acute illness; recent infection; allergic disease

Bengal immunity : Rs. 5.36 for 10ml vial

Serum Institute : Rs. 0.99 for 1ml amp.
Rs. 7.66 for 10 doses

22.3.2.1 CHOLERA VACCINE P

Indication : In endemic areas, pre-monsoon. During cholera epidemics. Before visiting crowded areas, eg., fairs and festivals.

Preparation/Dose : Dose: 0.5ml deep SC or IM 2nd dose 4–6 weeks after first. Booster every 6 months.
Prep: 1ml amp.
10ml vials

- S.P. : Store at 2°-8°C; do not freeze
- S.E. : Local pain and tenderness. Mild to moderate fever, 1-2 days.
- C.I. : Previous sensitivity to vaccine. Infants less than 1 year of age. ? pregnancy (safety not established)
- Draw back — Only 50% effective.
Does not prevent carrier state.

Brand/Cose

- BENGAL : 10ml amp: Rs. 5.28
IMMUNITY : 5ml vial: Rs. 5.20

22.3.1.4 MEASLES VACCINE P

- Indication : Primary immunisation (See schedule)
- Preparation/Dose : Prep: Hyperattenuated Schwartz strain. Each immunising dose has 1000 TCID 50 of live, hyperattenuated virus.
- S.E. : Short febrile illness about a week after immunisation. Rarely febrile convulsion, regional lymphadenopathy, thrombocytopaenic purpura, and pneumonia.
- S.P. : Store at 2° — 8°C.
Avoid light; use within one hour of reconstitution
- C.I. : Acute febrile illness; active untreated tuberculosis; eczema, urticaria. Immune deficiency states. Pregnancy, children below 8 months. History of convulsion; allergy to egg, protein.

Brand/Cost

- ROUVAX : Single dose vial: Rs. 10.00
(Institute Merieux) : 10 doses vial: Rs. 17.00

22.3.1.5 ORAL POLIO VACCINE (SABIN) P

- Indication : Routine immunization (see schedule)
- Preparation/Dose : Trivalent vaccine containing attenuated virus.
5ml vial (50 doses)
5ml vial (25 doses)
2ml vial (10 doses)
Dose: 0.1ml (2 drops) from a 50 dose vial.
0.2ml (4 drops) from a 25 dose or 10 dose vial.
Oral, using a sterile dropper or spoon.
- S.E. : Extremely rare risk of paralytic polio due to mutation and multiplication of type 3 virus.
- S.P. : Store at — 20°C to — 60°C for 2 years.
+ 4 to 8°C (6 months)
+18 to 22°C (3 weeks)
Do not freeze and thaw repeatedly.
Do not sterilise spoon/dropper with disinfectant, preferable to boil spoon/dropper and cool. Do not feed child with hot fluid soon after or just before dose; breast feeds may be given.

Brand/Cost

(MSD)
(SK&F)

22.3.1.6 TETANUS VACCINE (TETVAC)

- Indication : Non-immune or partially immune individual with a risk of developing tetanus, eg., after road accidents.
Routine antenatal immunization (see immunization schedule)
- Preparation/Dose : Dose: 0.5ml IM 2nd dose 6–12 weeks after the first and 3rd dose 6–12 months after the second.

Booster: every 5 years
Amp: of 0.5ml
vials of 10 doses.

S.E. : Mild pain and tenderness locally.

Brand/Cost

(Glaxo) : Rs. 1.20 for 0.5ml

(Serum Institute) : Rs. 10.40 for 10 amps of 0.5ml.

22.3.2 OTHER VACCINES

22.3.2.1 TYPHOID (TAB) VACCINE P

Indication : Primary immunisation (see immunisation schedule) Those living in endemic areas. Family contacts of patient with typhoid; hospital staff.

Preparation/Dose : Dose: 0.5ml deep IM, x 2 doses, at 4–6 weeks interval. Booster every 1–3 years.
5ml vial.
10ml vial.

C.I. : Pregnancy; immune deficiency conditions.
(check with product literature).

S.E. : Local pain and tenderness, malaise, headache, fever for 1–2 days.

S.P. : Store at 2–8°C; do not freeze.

Brand/Cost

(Bengal Immunity) : 20ml amp.: Rs. 2.36
5ml vial: Rs. 2.18

22.3.2.3 RABIES VACCINE

Indication : Prophylaxis and post-exposure treatment.

Preparation/Dose : Human diploid cell vaccine
Vial of freeze dried vaccine containing a single dose along with a disposable syringe containing 1ml of diluent.
Dose: 1ml deep SC for prophylaxis and 3 injections at an interval of one month — booster 1 year later. Post-exposure: 6 injections on day 0, 3, 7, 14, 30 & 90.

Purified chick embryo cell rabies vaccine
Dose 6 doses of 1ml IM each on day 0, 3, 7, 14, 30 & 90. Prophylaxis 3 doses on day 0, 28 and 56. Booster 1 year later.

Brand/Cost

HUMAN DIPLOID
CELL VACCINE

(Merieux) : Inj: Rs. 300.00 per ml.

RABIPUR : Inj: Rs. 130.00 per ml.
(Hoechst)

23. VITAMINS AND MINERALS

Vitamins are used for the prevention and treatment of specific deficiency states or where the diet is known to be inadequate. Their use as general "pick-me-ups" is of unproven value and in the case of preparations containing non-water soluble vitamins A or D, may actually be harmful, since they get accumulated in the body. Pyridoxine (B₆) deficiency may occur during isoniazid therapy. Severe deficiency of B group vitamins and encephalopathy as seen in chronic alcoholism are best treated by parenteral administration of B. Vitamins. In the treatment of scurvy, it is rarely necessary to prescribe more than 100mg. of vitamin C daily, except initially. Claims that Vitamin C ameliorates colds or promotes wound healing have not been proved.

Calcium supplements are usually only required where dietary calcium intake is deficient. This dietary requirement varies with age and is relatively greater in childhood, pregnancy and lactation due to increased demand and in old age, due to impaired absorption. In hypocalcemic tetany intravenous injection of calcium gluconate is given. Patients with hypoparathyroidism rarely require calcium supplements after the early stages of stabilization of vitamin D. Oral phosphate supplements may be required in addition to Vitamin D in a small minority of patients with hypophosphataemic vitamin D resistant rickets. Aluminium containing and calcium containing antacids are used as phosphate binding agents in the management of renal failure but are contra indicated in hypophosphataemia. Adequate fluoride during the period of tooth development confers significant resistance to dental caries. Where the natural fluoride contents of the drinking water is significantly less than 1 mg. per litre, artificial fluoridation is the most economical method. Regular application of fluoride to the teeth also reduces the incidence of dental caries.

VITAMINS

23.1.1 VITAMIN A

Indication : For prevention and treatment of specific deficiency states such as xerophthalmia; night blindness; Bitot's spots.

Route/Prep/Dose : Vit A tabs: 50,000 I.U.
Vit A Caps: 50,000 I.U.
Inj: 50,000 IU/ml — 1ml amp
Dose: For treatment 50,000 IU daily
For prevention 4000 units daily.
Drops: 150,000 Units per ml (30 drops)

S.E. : Massive over dose can cause rough skin, dry hair, enlarged liver, rise of ESR and serum calcium and alk. phosphate.

S.P. : Avoid excessive doses in pregnancy

Brand/Cost

AROVIT Chewable : 50,000 IU: Rs. 5.32 for 8
Tab (Roche) Drops: 150,000 IU/ml: Rs. 15.47 for 7.5ml
Inj : 100,000 IU/2ml: Rs. 27.60 for 6 amp.

AQUASOL : Cap: 50,000 IU: Rs. 11.02 for 30 caps
(USV & P) Inj : 50,000 IU/ml, 2ml amp: Rs. 1.86

23.1.2 VITAMIN B GROUP

23.1.2.1 VITAMIN B₁ (THIAMINE HCl)

Indication : Severe deficiency states. Encephalopathy as in chronic alcoholism; beriberi.

Route/Prep/Dose : Tab : 25mg
Inj : 100mg/ml
Dose: 10-25mg/day
Severe deficiency: 200-300mg/day.

Brand/Cost

BERIN : Tab : 100mg: Rs. 204.78 for 500
(Glaxo) Inj : 100mg/ml: Rs. 9.17 for 10ml vial.

23.1.2.2 VIT. B₂ (RIBOFLAVINE)

Indication : Angular stomatitis

Route/Prep/Dose : Tab : 5mg

Brand/Cost

RIBOFLAVINE : Tab : 10mg: Rs. 7.95 for 100
(TCF)

(A-I. Missions
Tablet Industry,
Bangarapet)

23.1.2.3 VIT B₆ (PYRIDOXINE HCl)

Indication : Peripheral neuritis; adjuvant in
treatment with INH.
Deficiency states.
Idiopathic sideroblastic anaemia.
Pre-menstrual syndrome.

Prep/Dose : Tab : 10mg
Dose: INH neuropathy: prophylaxis 10mg OD.
Therapeutic: 50mg TID
Idiopathic sideroblastic anaemia: 100–400mg
daily in divided doses.

Brand/Cost

PYRIDOXINE : Tab : 10mg: Rs. 112.45 for 1000
(British Pharma) Inj : 25mg/2ml: Rs. 76.73 for 50 amps.

23.1.2.4 FOLIC ACID

Indication : Megaloblastic anaemia along with B₁₂.
Anaemia of pregnancy

Preparation : Tab : 5mg

S.P. : May precipitate subacute combined degeneration of the spinal cord if used alone in pernicious anaemia or other B₁₂ deficiency state.
Patients who may have folate dependent tumours.
Epileptic patient — occasionally reduces plasma concentrations of phenytoin.

FOLIC ACID : Tab : 5mg; Rs. 70.00 for 1000
(Beekay Pharma)

(Ar-Ex) : Tab : 5mg; Rs. 55.00 for 1000

23.1.2.5 NICOTINAMIDE

Indication : Pellagra; deficiency states

Preparation : Tab: 50mg

Brand/Cost

Co-oper Pharma : Rs. 22.50 for 1000 tabs

23.1.2.6 VIT B₁₂ (HYDROXYCOBALAMIN)

Indication : Addisonian pernicious anaemia. Subacute combined degeneration of spinal cord.
Other causes of vit B₁₂ deficiency.
Nitrous oxide induced megaloblastosis.

Preparation/Dose : Inj : 500 microgram/ml
Dose: Initially 1mg repeated 5 times at intervals of 2–3 days.
Maintenance dose: 1mg every 3 months.

Brand/Cost

MACRABIN : Liquid: 35 microgram/5ml: Rs. 3.55 for 115ml.
(Glaxo) Inj : 500 microgram/ml: Rs. 5.79 for 5ml

CYANOCO-
BALAMIN : Inj : 500 microgram/ml: Rs. 6.42 for 10ml vial.
(Bengal Immunity)

23.1.2.7 B-COMPLEX

Indication : Vit. B complex deficiency state.
Preparation/Dose : Tab, liquid, inj. Dose as per instructions.

Brand/Cost

Complex — B : Tab: Rs. 4.63 for 50
(Glaxo)

BECOSULES : Caps : Rs. 9.03 for 20
(Pfizer) Syrup: Rs. 5.08 for 50ml

NEUROBION : Tab : Rs. 1.65 for 10
(E. Merck) Inj : Rs. 132.25 for 50 amps.

VIT-B COMPLEX : Syrup: Rs. 7.44 for 110 ml.
(IDPL)

VIT C (ASCORBIC ACID)

Indication : Scurvy
Vit-C deficiency in elderly. Haemorrhagic
diseases with increased capillary fragility.

Route/Prep/Dose : Tab : 100mg
Dose: Prophylactic: 25–50mg daily.
Therapeutic: 250mg daily in divided doses.

Brand/Cost

ASCORBIC ACID : Tab : 100mg: Rs. 60.00 for 1000
(CMS-I)

CELIN : Tab : 100mg: Rs. 10.58 for 100
(Glaxo)

23.1.4 VIT D

Indication	: Vit. D deficiency states (Rickets; renal osteodystrophy)
Route/Prep/Dose	: Inj : 300,000 IU/ml Granules: 600,000 IU/g. Vit. A & D capsules Vit. A — 6000 IU Vit. D — 1000 IU Dose: prevention — 400 units daily. Treatment — 40,000 — 200,000 Units Calcium levels to be monitored periodically (weekly) when pharmacological doses are given; high dose combinations of calcium and Vit. D are better avoided.

Brand/Cost

ARACHITOL (Duphar)	: 300,000 IU: Rs. 3.73 for 3 amp.
CALCIROL (Cadila)	: Granules — 600,000 IU/gram: Rs. 2.37 for 1g sachet.

23.1.5 Vit. K

Indication	: Deficiency in neonates. Deficiency of Vit. K in biliary obstruction. For reversal of haemorrhage caused by overdosage of anti-coagulants.
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Preparation/Dose	: Inj : 10mg/ml.
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Brand/Cost

KAPILIN (K ₃) (Glaxo)	: Inj : 10mg per ml: Rs. 9.00 per 6 amp.
KONAKION (K ₁) (Glaxo)	: Tab : 10mg: Rs. 8.24 for 100

23.1.6 MULTIVIT. PREPS.

Indication : Deficiency states

MINERALS

23.2.1 CALCIUM

Indication : Calcium deficiency during childhood.
Pregnancy and lactation.
Old age osteoporosis.
Patients with hypoparathyroidism.
Hypocalcaemic tetany.
Cardiac arrest.

Preparation/Dose : Tab : 300mg
Inj : 100mg/ml in 10ml amp.

S.E. : Bradycardia; arrhythmias; irritation after IV injection.

C.I. : Parental calcium treatment; contraindicated in patients receiving cardiac glycosides.

Brand/Cost

CALCIUM : Inj : 10%, 5ml amp: Rs. 12.09 for 10
SANDOZ (Sandoz) Syrup: Rs. 4.31 for 85ml
Calcium Sandoz + Vit. C, D and B₁₂
Tab : Rs. 5.86 for 50.

CALCIUM
GLUCONATE : Inj : 10%, 10ml amp: Rs. 40.00 for 50 amp
(G.L. Pharma)

23.2.2 ZINC

Indication : Deficiency state

Preparation/Dose : Multivitamin preparations containing Zinc.

24. ENDOCRINES

INSULIN

The commercially available preparations of insulin are mixtures of beef and pork pancreas. Newer insulins, prepared by purification of these mixtures (eg., Actrapid, Monotard) and human insulin, prepared by recombinant DNA technology, have recently been made available in India. Insulin is indicated in insulin dependent diabetes mellitus, gestational diabetes and complicated cases of non-insulin dependent diabetes mellitus (ketosis, acute infection, surgery and failure of sulfonylureas).

Insulin preparations are broadly classified as rapid acting (soluble insulin), intermediate acting (lente insulin) and slow acting (ultralente insulin). The choice of insulin depends on patient compliance, ease of administration and phase of therapy. Soluble insulin is used (2-3 times daily) in the initiation phase and is useful in arriving at the daily insulin requirement. Doses are titrated against urine or blood sugars. In the maintenance phase, the patient is switched on to an intermediate acting insulin (usually lente) to reduce the frequency of injection; for tight control of blood sugars throughout the day. mixtures of soluble and lente insulin are given as two doses (morning and late evening) per day.

The older preparations are fairly unstable and require care in storage, preparation and mixing. The vial should be refrigerated or stored in a clay pot filled with sand and water. Insulin should not be stored in ice. Patients should be taught the technique of self-injection, measurement of dose, stressing the need for proper sterilization of syringes and needles.

The side effects of older insulins are hypoglycemia, lipodystrophy and immunologic reactions. Hypoglycemia can be prevented by careful adjustment of dose, regular meals and avoidance of sudden exercise. Lipodystrophy, insulin allergy and insulin resistance can be reversed by changing to a newer insulin.

Insulin preparations

(depending on speed and duration of action following subcutaneous injection)

Class	Preparation Onset	duration	Duration of action in hours
Fast acting	Insulin injection (regular insulin) ACTRAPID	1	6
Intermediate acting	Isophane insulin suspension (NPH insulin)	2	24
	Insulin zinc suspension (Lente insulin), MONOTARD	2	24
Long acting	Protamine zinc insulin suspension (PZI)	7	36

24.1 ANTIDIABETIC AGENTS

24.1.1 INSULIN

24.1.1.1 INSULIN (Soluble; Plain; Neutral)

Indication : Diabetes Mellitus; diabetic ketoacidosis (short acting) (Maximum effect 2–4 hours and can last up to 8 hours).

Route/Prep/Dose : Dose and route according to patient's requirement, usually SC; IM or IV as required,
40 Units/ml vial
80 Units/ml vial

S.E. : Over dose causes hypoglycaemia. Local reactions (during first few weeks of treatment) and lipo-atrophy at injection site occur. Local reactions usually transient and require no treatment. (reduce dose in renal impairment).

Brand/Cost

INSULIN : Inj : 40 units per ml — 10ml vial: Rs. 12.44
(Boots)

ACTRAPID : Inj : 40 units per ml — 10ml vial: Rs. 55.00
(Novo)

24.1.1.2 INSULIN ISOPHANE (-NPH)

Indication : Diabetes Mellitus (intermediate acting).
Onset of action: 1-2 hours,
Max effect: 4-12 hours
Duration of action: 16-24 hours

Route/Prep/Dose : 40 Units/ml vial SC according to requirement.
Not suitable for IM or IV use. (Can be mixed with neutral insulin in the syringe).

Brand/Cost

INSULIN
ISOPHANE : Inj : 40 units, 10ml vial: Rs. 12.49
(NPH — Boots)

24.1.1.3 INSULIN PROTAMINE ZINC (PZI)

Indication : Diabetes Mellitus (Prolonged action: duration of action: 16-35 hours)

Route/Prep/Dose : 40 units/ml SC according to requirement.

S.P./C.I. : Should not be mixed with soluble Insulin in the syringe. Not suitable for IM or IV use.

Brand/Cost

INSULIN

PROTAMINE ZINC : Inj : 40 units, 10ml vial: Rs. 12.58
(Boots)

24.1.1.4 INSULIN ZINC (LENTE) SUSPENSION

Indication : Diabetes Mellitus
(Long acting)
(Can be mixed with soluble insulin)
Onset — 1–2 hours. Max effect: 4–12 hours;
duration: 16–24 hours.

Route/Prep/Dose : 40 units/ml vial
80 units/ml vial
SC as per requirement

Brand/Cost

INSULIN ZINC

SUSPENSION

(LENTE) : Inj : 40 units per ml, 10ml vial: Rs. 12.43
(Boots)

MONOTARD : Inj : 40 units per ml, 10ml vial: Rs. 78.00
(Novo)

24.1.2 ORAL ANTIDIABETICS**24.1.2.1 CHLORPROPAMIDE (Sulphonyl urea) DI P**

Indication : Diabetes Mellitus
(Type 2; NIDDM)
Diabetes insipidus.

Route/Prep/Dose : Tab : 100mg & 250mg
Dose: 250mg daily with breakfast.
(Elderly patients: 100–125mg OD; better avoided
in the elderly)
Max: 500mg daily.

S.P. : Avoid during pregnancy and breast feeding.
Caution in elderly and those with renal failure.
Can cause prolonged hypoglycaemia. Substitute
with Insulin therapy during intercurrent illness
(myocardial infarction, coma, infection, trauma)
and during surgery.

S.E. : Gastro-intestinal disturbances, headache, facial
flushing after alcohol.

C.I. : In presence of ketoacidosis.

Brand/Cost

DIABENESE : Tab : 100mg: Rs. 1.38 for 10
(Pfizer) 250mg: Rs. 2.10 for 10

24.1.2.2 GLIBENCLAMIDE (Sulphonylurea) P

Indication : NIDDM: Type 2 diabetes (Duration of action
between tolbutamide and chlorpropamide)

Preparation/Dose : Tab : 5mg
Dose: 5mg daily.
Dose adjusted according to response.
Max: 20mg daily (taken with breakfast); may be
given in divided doses BD.

SE/S.P./C.I. : As under Chlorpropamide: 24.1.2.1

Brand/Cost

GLIBENCLAMIDE : Tab : 5mg: Rs. 110.00 for 1000
(CMS-I)

DAONIL : Tab : 5mg: Rs. 8.88 for 100
(Hoechst)

EUGLUCON : Tab : 5mg: Rs. 8.88 for 100
(Boehringer Knoll)

24.1.2.3 GLIPIZIDE (Sulphonylurea) P

- Indication : Type 2 diabetes (Duration of action similar to Glibenclamide)
- Route/Prep/Dose : Tab : 5mg
Dose: 2.5mg — 5mg adjusted according to response. Max: 40mg daily; upto 15mg may be given as a single dose before breakfast; higher doses given divided.
- S.P./C.I. : As under Chlorpropamide: 24.1.2.1

Brand/Cost

- GLYNASE : Tab : 5mg: Rs. 4.00 for 10
(USV)

24.1.2.4 TOLBUTAMIDE (Sulphonylurea) DI P

- Indication : Type 2 diabetes
(short duration of action)
- Route/Prep/Dose : Tab : 500mg: 1g.
500mg — 1.5g (max 2g daily) in divided doses.
- S.E. : As under Chlorpropamide: 24.1.2.1

Brand/Cost

- RASTINON : Tab : 0.5mg: Rs. 25.00 for 100
(Hoechst)

24.1.2.5 METFORMIN (Biguanide) DI R H P

- Indication : Type 2 diabetes, especially over weight patients.
- Route/Prep/Dose : Tab : 0.5g
- S.E. : Anorexia; nausea; vomiting; diarrhoea, lactic acidosis (especially in renal failure); decreased Vit. B₁₂ absorption.

C.I. : Renal or hepatic failure. Predisposition to lactic acidosis; heart failure; severe infection or trauma; dehydration; alcoholism.

Brand/Cost

GLYCIPHAGE : Tab : 0.5g: Rs. 2.79 for 8
(Franco Indian)

24.2 ADRENAL HORMONES & SYNTHETIC SUBSTITUTES

CORTICOSTEROIDS

These are mainly indicated for their immuno suppressant effects, suppressing disease processes and for replacement therapy.

REPLACEMENT THERAPY: In deficiency states, physiological replacement is best achieved with a combination of oral hydrocortisone and mineralo corticoid — fludrocortisone. Hydrocortisone alone does not provide sufficient mineralocorticoid activity. The more potent synthetic glucocorticoids such as fludrocortisone along with prednisolone is practicable.

For suppression of disease process, betamethasone, dexamethasone, hydrocortisone, prednisolone are used for their anti-inflammatory effect.

Equivalent doses of glucocorticoid

Drug	Equivalent anti-inflammatory dose (in mg.)
Betamethasone	0.75
Cortisone	25.00
Dexamethasone	20.75
Hydrocortisone	20.00
Prednisone	5.00
Prednisolone	5.00
Triamcinolone	4.00

High potency is of no advantage but effect on water and electrolyte is of significance. Prednisolone, the commonest used is given orally. All are given in divided doses for continuous effect. They are also used for acute hypersensitivity reaction, anaphylactic shock and as an adjunct with adrenaline. These are also indicated in emergency treatment of acute severe asthma. They are used in auto immune diseases such as rheumatoid arthritis, lupus erythematosus etc. Corticosteroids reduce antibody formation and hence may be used to suppress or modify allergic reactions.

DISADVANTAGES: Prolonged use results in Cushing's syndrome, altered glucose tolerance hypersensitivity, osteoporosis, mental disturbances, muscle weakness. There may be growth retardation in children, increased susceptibility to infections.

Exogenous corticosteroids suppress corticotrophin and may lead to adrenal atrophy which can persist for years. Withdrawal of steroid therapy must be done in a graded manner to avoid symptoms of acute adrenal insufficiency.

DRUG INTERACTIONS: Concomitant administration with anti-hypertensive drugs result in reduced antihypertensive effect; with aspirin there is enhanced gastric irritation and decreased diuretic effect and hypokalaemia with diuretics.

24.2.1 BETAMETHASONE

Indication	: Status asthmaticus; suppression of inflammatory and allergic disorders; cerebral oedema; congenital adrenal hyperplasia.
Prep/Dose	: Tab : 0.5mg Inj : 4mg/ml Drops: 0.5mg/ml Dose : 0.5–5mg, daily; reduce to maintenance Inj : 4–20mg IM, IV or SC

repeated 3-4 times daily if required. 1-8mg intra articular.

Child : 0.2-0.5mg/kg in divided doses.

- S.E. : Adrenal suppression; Cushings syndrome with moon face; striae and acne.
- S.P. : When treatment is to be discontinued, dose should be tapered gradually. Renal and hepatic insufficiency.
- C.I. : Tuberculosis; herpes simplex; systemic fungal infections; active peptic ulcer; local or systemic infections unless controlled. Diabetes mellitus, osteoporosis, glaucoma, diverticulitis; myasthenia gravis, hypertension, cardiac failure.

Band/Cost

BETNESOL : Tab : 0.5mg: Rs. 2.55 for 10
(Glaxo) Inj : 4mg/ml: Rs. 3.11 for 1ml

24.2.2 DEXAMETHASONE

Indication : As for Betamethasone

Preparation/Dose : Tab : 0.5mg
Inj : 4mg/ml — 2ml vial
Dose: Emergency: start with 1ml inj.
Child: 0.2mg/kg/dose IM or IV
Tab : 0.5mg/kg in divided doses.
Inj : (shock pack): 20mg/5ml vial

S.E./S.P./C.I. : As for Betamethasone

Brand/Cost

DECADRON : Tab : 0.5mg: Rs. 2.21 for 10
(Merind) Inj : 4mg/ml: Rs. 8.88 for 2ml vial

IDIZONE : Tab : 0.5mgd: Rs. 7.51 for 10
(IDPL) Inj : 4mg/ml: Rs. 4.33 for 2ml vial

DEXONA SHOCK

PACK : Inj : 20mg/ml: Rs. 30.04 for 5ml
(Cadila)

24.2.3 HYDROCORTISONE SODIUM SUCCINATE

Indication : Adrenocortical insufficiency; suppression of inflammatory and allergic disorders; shock; collagen diseases; status asthmaticus.

Preparation/Dose : Inj : 100mg/5ml up to 1g/day
Child: 5mg/kg/dose

S.P./C.I. : As for Betamethasone.

Brand/Cost

EFCORLIN Soluble : 134mg/vial: Rs. 14.00 per vial
(Allenbury)

LYCORTINS : Inj : 100mg: Rs. 9.24
(Lyka)

24.2.4 HYDROCORTISONE ACETATE

Indication : To be given intra-articular
Intradermal
Intrapleural and sub-conjunctival injection

Preparation/Dose : 25mg/ml 5ml vial

S.P. : Not to be given IV, IM or S/C.

Brand/Cost

WYCORT : 25mg/ml: Rs. 9.18 for 5ml.
(Wyeth)

24.2.5 PREDNISOLONE

Indication : Suppression of inflammatory and allergic disorders.

Preparation/Dose : Tab : 5mg, 10mg
 S.P./S.E./C.I. : As for Betamethasone (Injection not for IV use)

Brand/Cost

WYSOLONE : Tab : 5mg: Rs. 3.09 for 10
 (Wyeth) Tab : 10mg: Rs. 5.95 for 10

DELTACORTIL : Tab : .5mg: Rs. 3.09 for 10
 (Pfizer) 10mg: Rs. 6.13 for 10

24.2.6 TRIAMCINOLONE

Indication : Inj : 10mg/ml
 40mg/ml
 Dose: 2.5–15mg intra-articular
 0.1–0.3ml intradermal.

S.P. : Not to be given IV; not for children under 6 years.

Brand/Cost

KENACORT : Tab : 1mg: Rs. 4.02 for 10
 (Sarabhai)
 Inj : 10mg: Rs. 12.07 for 1ml
 Rs. 28.16 for 1ml.

24.3 ANDROGENS

24.3.1 TESTOSTERONE H P

Indication : Hypogonadism; male climacteric; senile
 osteoporosis; carcinoma breast in
 premenopausal female.

Preparation/Dose : Inj : 25mg/ml, 50mg/ml, 100mg/ml 200mg/ml.
 1ml ampoule.
 Dose: See literature with product.

C.I. : Prostatic cancer, pregnancy, ischaemic heart
 disease, breast feeding, nephrosis.

S.E. : High doses cause virilism in women and suppress spermatogenesis in men. Oedema, increase in weight, hypercalcaemia; increased bone growth; priapism; premature closure of epiphysis in early puberty. Prostatism in elderly patients; cholestatic type of jaundice.

Brand/Cost

TESTANON-25 : Inj : 25mg/ml: Rs. 4.65 per amp.
(Infar)

TESTOVIRON : Inj : 100mg/ml: Rs. 175.00 for 10 amp.
DEPOT : 250mg/ml: Rs. 330.00 for 10 amp.
(German Remedies)

PROVIRONUM : Tab : 25mg: Rs. 141.21 for 30
(German Remedies)

24.4 OESTROGENS

Oestrogens are now used as oral contraceptives with progestogens since oestrogens suppress ovulation and inhibit production of follicle stimulating hormone (FSH) thereby inhibiting ovulation. They may also be used with benefit in cases of prostatic cancer and breast cancer. Several gynaecological disorders such as premature ovarian failure, dysfunctional uterine bleeding and spasmodic dysmenorrhoea also benefit from oestrogen-progesterone cyclic combinations but the risk of thrombo-embolism should be kept in mind. Hormone replacement therapy is not routinely recommended in post-menopausal women but small doses of oestrogen given for long periods will diminish post-menopausal osteoporosis. A short course can also be tried in menopausal vasomotor symptoms, and topical preparations in severe atrophic vulvo-vaginitis. Progesterone should be added cyclically in these post-menopausal women to prevent a possible endometrial carcinoma, except in those who have undergone a hysterectomy. Oestrogens are no longer used to suppress lactation because of the risk of thrombo-embolism. Other side effects include nausea, weight gain, mastalgia, headache and changes in liver function.

Ethinylestradiol is the oestrogen of choice for most conditions. Stilbesterol is used mainly in neoplastic conditions. The natural oestrogens have not been shown to have any advantages over synthetic preparations. Subcutaneous or transdermal administration of synthetic preparations closely mimic endogenous hormonal activity.

24.4.1 STILBOESTEROL P H R L

- Indication : Post menopausal breast cancer.
Prostatic carcinoma.
Suppression of lactation.
- Preparation/Dose : Tab : 5mg
Dose: Breast cancer: 10-20mg daily
Prostatic cancer: 1-3mg daily.
- S.E. : Nausea, vomiting, weight gain, sodium retention, jaundice, rashes, headache.
- C.I. : History of thromboembolism; hepatic impairment; endometriosis; undiagnosed vaginal bleeding.
- Caution : Pregnancy, breast feeding, diabetes, epilepsy, hypertension, cardiac or renal disease, history of jaundice.

Brand/Cost

STILBOESTROL : Tab : 5mg: Rs. 25.00 for 1000
(Cooper Pharma)

24.4.2 STILBOESTROL DIPHOSPHATE P H R L

- Indication : Prostatic cancer
- Preparation/Dose : Tab : 100mg
Inj : 50mg/ml, 5ml amp.
Dose: 100-200mg, 3 times daily reducing to 100-300mg daily.

I.V. : slow IV inj. 552-1104mg daily for 5 days at least, then maintenance 276mg, 1-4 times weekly.

Brand/Cost

HONVAN : Inj : 50mg/ml: Rs. 182.35 for 10
(Khandalwal) Tab : 0.1mg: Rs. 90.42 for 20

24.4.3 ETHINYLOESTRADIOL H

Indication : Disturbances in menstrual cycle; dysfunctional uterine bleeding; delay in menstruation; menopausal symptoms.

Preparation/Dose : Tab : 0.05mg ethinyloestradiol.

S.E. : Nausea, vomiting, weight gain, breast enlargement and tenderness, withdrawal bleeding, sodium retention with oedema, jaundice, rashes, depression, headache, endometrial cancer in post-menopausal women.

C.I. : Oestrogen dependent cancer; history of thromboembolism; hepatic impairment; endometriosis; undiagnosed vaginal bleeding.
Caution as under stilboesterol.

Brand/Cost

ORGALUTIN : Tab : Rs. 9.05 for 10
(Infar)

24.4.4 OESTROGENS — CONJUGATED H P

Indication : As under 24.4.3

Preparation/Dose : Tab : 625 micrograms
Dose: Menopausal symptoms (short term):
0.625-1.25mg daily for 21 days from 5th day of cycle, repeated after 7 days if necessary.

Brand/Cost

PREMARIN (Manners)	:	Tab	:	1.25mg: Rs. 35.30 for 20
				0.625mg: Rs. 22.72 for 20
		Inj	:	Rs. 55.41 for 20ml vial

24.5 PROGESTOGENS

Progestogens modify some of the effects of oestrogens and act mainly on tissues sensitised by them; their effects are inhibited by excess of oestrogens. There are two main groups of progestogens, the naturally occurring hormone progesterone and its analogues (allyloestrenol, hydrogesterone, hydroxyprogesterone and medroxy progesterone) and the testosterone analogues e.g., norethisterone. Progesterone and its analogues are less androgenic than testosterone derivatives and neither progesterone nor hydrogesterone causes virilisation. Other synthetic derivatives are variably metabolised into testosterone and oestrogen; thus side effects vary with the preparation and the dose.

Progestogens are useful in many menstrual disorders, including severe dysmenorrhoea, dysfunctional uterine bleeding and in premenstrual syndrome. Norethisterone may be used alone on a cyclical basis during part of the menstrual cycle or in conjunction with oestrogens. Progesterones can be used in the treatment of endometriosis. Hydroxyprogesterone hexanoate — a true progesterone derivative — has been used in habitual abortion but its efficacy is doubtful.

Indication	:	Dysfunctional uterine bleeding, primary and secondary amenorrhoea, endometriosis; premenstrual syndrome; polymenorrhoea; habitual and threatened abortion and endometrial cancer
S.E.	:	Nausea, vomiting, headache, muscle cramps, scanty menstruation, virilism.
C.I.	:	Idiopathic jaundice, herpes, severe liver disorders, thromboembolic disorders, severe pruritus of pregnancy.

24.5.1 ALLYLOESTRENOL H P

Indication : As under 24.5
Preparation/Dose : Tab : 5mg
Dose: 5-10mg daily for atleast 16 weeks.
S.P./C.I. : as above

Brand/Cost

GESTANIN : Tab : 5mg: Rs. 16.90 for 10
(Infar)

24.5.2 LYNOESTRENOL H P

Indication : as above
Preparation/Dose : Tab : 5mg
Dose: Varies with condition
S.P./C.I. : As above

Brand/Cost

ORGAMETRIL : Tab : 5mg: Rs. 15.75 for 10
(Infar)

24.5.3 NORETHISTERONE H P

Indication : As above
Preparation/Dose : Tab : 5mg
Dose: as per indication
S.P./C.I. : As above

Brand/Cost

PRIMOLUT-N : Tab : 5mg: Rs. 117.00 for 100
(Gernian Remedies)

24.5.4 HYDROXYPROGESTERONE CAPROATE H P

Indication : As for progestogens

Preparation/Dose : Inj : 125mg/ml — 1ml amp.
250mg/ml — 1ml amp.
500mg/ml — 1ml amp.

S.P./C.I. : As for Progestogens

Brand/Cost

PROLUTON

DEPOT : Inj : 125mg: Rs. 95.40 for 10 amp.
(German Remedies): 250mg: Rs. 198.00 for 10

24.5.5 MEDROXYPROGESTERONE H P

Indication : As for progestogens

Preparation/Dose : Tab : 5mg; 10mg
Dose: varies with the indication

S.P./C.I. : As for progestogens

Brand/Cost

FARLUTAL : Tab : 10mg: Rs. 28.12 for 10
(Walter Bushnell)

24.6 OVULATION INDUCERS

24.6.1 CLOMIPHENE CITRATE H P

Indication : Anovulatory infertility

Preparation/Dose : Tab : 50mg
Dose: 50mg daily for 5 days starting on 5th day
of menstrual cycle or at any time if cycles
have stopped.
Maximum six courses. Dose may be increased by
50mg each month. Max. 200mg daily for 5 days.

S.E. : Visual disturbances, ovarian hyperstimulation, hot flushes, abdominal discomfort, nausea, vomiting, insomnia, breast tenderness, weight gain, rashes, dizziness, hair loss.

C.I. : Hepatic disease, ovarian cyst, endometrial cancer, pregnancy, abnormal uterine bleeding.

Brand/Cost

FERTYL Tab (Ar-Ex) : Tab : 25mg: Rs. 200.00 for 80

FERTOMID (Cipla) : Tab : 25mg: Rs. 75.00 for 10

24.7 BROMOCRIPTINE P H R L

Indication : Suppression of lactation, amenorrhoea, galactorrhoea and infertility due to hyperprolactinaemia; parkinsonism.

Preparation/Dose : Tab : 25mg

S.E. : Nausea, vomiting, drowsiness, headache, postural hypotension, dyskinesia, dry mouth, leg cramps, pleural effusion; retroperitoneal fibrosis.

S.P. : Impaired hepatic or renal function, peptic ulcer, diabetes, psychosis or severe cardiovascular disease.

C.I. : Sensitivity to ergot alkaloids.

Brand/Cost

PROCTINAL (Biddle Sawyer) : Tab : 25mg: Rs. 222.00 for 30

B-CRIP (Chemech) : Tab : 2.5mg: Rs. 57.50 for 10

24.8 THYROID HORMONES & ANTITHYROID DRUGS

24.8.1 THYROXINE SODIUM L

Indication : Hypothyroidism

Preparation : Tab : 100 micrograms
Dose: 50-100 micrograms initially increasing by 50 micrograms at 2-4 weeks intervals. Usual maintenance dose: 100-200 micrograms daily as a single dose.
Children/infant: 25-50 micrograms/day.

S.P. : Elderly and those with cardiac disease

Brand/Cost

ELTROXIN : Tab : 100 micrograms: Rs. 11.00 for 100
(Allenburys)

ROXIN : Tab : 100 micrograms: Rs. 7.37 for 100
(Cadilla)

24.8.2 CARBIMAZOLE P L

Indication : Thyrotoxicosis, preparation for thyroidectomy.

Preparation/Dose : Tab : 5mg
Dose: Initially 15-45mg/day in divided dose till euthyroid, then reduce to maintenance dose: 5-15mg daily.

S.P. : Large goitre, pregnancy, breast feeding. Blood count to be done regularly.

S.E. : Agranulocytosis, jaundice, nausea, rashes, arthralgia, alopecia rarely.

Brand/Cost

NEO-MERCAZOLE : Tab : 5mg: Rs. 47.34 for 100
(Nicholas)

24.8.3 POTASSIUM IODIDE (Lugol's Iodine) P L

- Indication : Thyrotoxicosis, pre-operative preparation
- Preparation/Dose : 5% and 10% solution in water.
Dose: 0.1-0.3ml TID — 10-14 days
- S.E. : Hypersensitivity reactions
- Caution : Pregnancy
- C.I. : Breast feeding.

24.9 HYPOTHALMIC AND PITUITARY HORMONES

24.9.1 CLOMIPHENE CITRATE : See 24.6.1

24.9.2 ACTH (CORTICOTROPHIN)

- Indication : As diagnostic agent to assess adrenal function.
Long acting depot forms may be used as an alternative to corticosteroids in conditions such as Crohns disease or rheumatoid arthritis, advantages being less adrenocortical suppression and less growth retardation.
- Preparation/Dose : Dose: By SC or IM inj.
initially 40-80 units daily — reducing according to response.

Brand/Cost
ACTHAR GEL
(Rorer)

24.9.3 TETRACOSACTRIN

- Indication : As for ACTH
- Preparation/Dose : Inj : 250 micrograms/ml
Dose: diagnostic by IM injection 250 micrograms as a single dose.

Depot Inj. 1000 micrograms (1mg)/ml by IM inj. initially; 500-1000 micrograms twice weekly or in acute conditions daily x 3 days and then adjusted according to response. Child up to 1 year: 250 micrograms daily and adjusted according to response.

S.P./C.I. : As for ACTH

Brand/Cost

SYNACTHEN

(Ciba)

SYNACTHEN

(DEPOT)

: Currently not available in the country.

(Ciba)

24.9.4 CHRIONIC GONADOTROPHIN (HCG) R

Indication : Delayed puberty in male and oligospermia associated with hypopituitarism (not in primary gonadal failure). Recurrent abortion. Premenstrual syndrome.

Preparation/Dose : 1000 IU freeze dried powder and solvent in separate amps. Also available as 2,000 and 5,000 IU ampoules.
Dose: according to patient's requirement.

S.E. : Oedema (particularly in males), headache, tenderness, mood changes, local reactions, sexual precocity with high doses.

S.P. : Cardiac or renal impairment, asthma, epilepsy, migraine.

Brand/Cost

GONADOTRA-

PHON-L.H.

(Biochem)

: Inj : 1000 IU: Rs. 82.05 for 3 amp

PROFASI : Inj : 1000 IU: Rs. 257.80 for 3 amps.
 (Serum Institute) 2000 IU: Rs. 272.05 for 3 amps
 5000 IU: Rs. 146.09 for 1 amp

24.9.5 FOLLICLE STIMULATING HORMONE (FSH) P

Indication : Infertile women with proven hypopituitarism.
 Delayed puberty.
 Defective spermatogenesis.

Preparation/Dose : 1000 IU freeze dried powder and solvent in
 separate ampoules.
 Dose: according to patient's response.

S.E. : Ovarian hyperstimulation; multiple pregnancy;
 local reactions.

C.I. : Pregnancy

S.P. : Ovarian cysts; adrenal or thyroid disorders;
 intracranial lesions.

Brand/Cost

GONADOTRA-
 PHON FSH
 (Biochem)

: Inj : 1000 IU: Rs. 231.30 for 3 amp.

24.9.6 VASOPRESSIN (ADH) R

Indication : Diabetes insipidus; variceal bleeding.

Preparation/Dose : Injection, S.C./IM. 5-20 units every 4 hours.
 Variceal bleeding: IV 20 units over 15 minutes.

S.E. : Pallor, nausea, cramps, hypersensitivity
 reactions, constriction of coronary arteries.

C.I. : Vascular disease, renal impairment

Caution : Heart failure, asthma, epilepsy, migraine.
 Adjust fluid intake.

Brand/Cost

PITRESSIN : Inj : Rs. 477.90 for 10 amps.
(Parke Davis & Co)

24.9.7 OXYTOCIN

Indication : As under 19.1.2

Brand/Cost

PITOCIN : Inj : Rs. 6.72 for 6 amp.
(P.D. & Co)

SYNTOCINON : Inj : 5 IU per ml: Rs. 6.72 for 6 amps.
(Sandoz) 2 IU per 2ml: Rs. 7.15 for 6 amps.

24.10 OTHER ENDOCRINE DRUGS**24.10.1 BROMOCRIPTINE:See 24.7****24.10.2 DANAZOL P L H R**

Indication : Endometriosis; menorrhagia and other menstrual disorders; ; mammary dysplasia; gynaecomastia. Long term management of hereditary angioedema (drug of choice)

Preparation/Dose : 50mg, 100mg & 200mg capsules.
Dose: Endometriosis and associated infertility: 200-400mg daily for 3-6 months in 2-4 divided doses. Breast disorders: 100-400mg daily for 3-6 months.
Menorrhagia: 100-400mg daily (usual 200mg) for 3 months and then renew.

S.E. : Nausea, dizziness, rashes, backache, flushing, skeletal muscle spasm, hair loss, mild androgenic effects. Thrombocytopaenia rarely.

S.P. : Cardiac, hepatic or renal impairment, epilepsy, diabetes, migraine, lactation.

C.I. : Porphyria, pregnancy.

Brand/Cost

DANOGEN : Caps: 50mg: Rs. 160.00 for 30
(Cipla)

LADOGAL : Caps: 50mg: Rs. 197.10 for 30
(Win-Medicare) 100mg: Rs. 369.00 for 30
200mg: Rs. 654.00 for 30

24.11 CONTRACEPTIVES

24.11.1 ORAL CONTRACEPTIVES

COMBINED ORAL CONTRACEPTIVES

Best to start with a pill which contains 0.05mg or less of oestrogen. After a few cycles a pill containing less oestrogen (0.02mg to 0.03mg) or a triphasic pill may be prescribed.

(Progestogen only pills are not yet available in India)

(Stop pill after 2-3 years of continuous use).

S.E.: Minor — nausea, vomiting, weight gain, oedema, fluid retention, breast fullness, tenderness, headache, intermenstrual spotting, breakthrough bleeding, scanty bleeding, vaginitis, moniliasis, erosion cervix, leucorrhoea, depression, acne, chloasma, cornual oedema, hypertrophic gingivitis, leg cramps, urticaria, alopecia (rare).

Major — thrombo-embolism (pelvis, lungs, brain), thrombophlebitis, coronary thrombosis, myocardial infarction, neurovascular complication, cerebrovascular accidents.

C.I.: Absolute

1. Thromboembolic disorders or history thereof.
2. Cardiovascular accidents or history thereof.
3. Active liver disease

4. Known or suspected malignancy of breast or reproductive system.
5. Known or suspected oestrogen dependent neoplasia.
6. Obstructive jaundice in pregnancy.
7. Pregnancy
8. Lactation
9. Hypercholesterolaemia (above 300mg/100ml fasting)
10. Congenital hyperlipidaemia
11. Undiagnosed genital bleeding
12. Excessive smoking
13. Overweight by 120%

Relative (strong)

1. Migraine headaches
2. Hypertension
3. Epilepsy
4. Neuro-ocular lesions
5. Diabetes or family history thereof
6. Gall bladder disease
7. History of cholestasis during pregnancy
8. Delivery within past four weeks.
9. Uterine fibroids
10. Mononucleosis
11. Women over 35 years

Other contra indications:

1. Varicose veins
2. Bronchial asthma
3. Cardiac or renal disease
4. Mental retardation
5. Depression
6. Cholasma
7. Late menarche or irregular periods
8. Previous history of anovulation or infertility
9. Before elective surgery

Practical instructions to the pill user

1. Begin the first pill on the first Sunday after the periods.
2. Swallow one pill a day, preferably at meal time or before going to bed.
3. If it is a 21 day pack begin a new pack on the first Sunday after stopping the old pack.
4. If it is a 28 day pack begin a new pack immediately without interruption.
5. Use the second back up method (condom or post-coital vaginal pessary) during the first month.
6. Use the second method in an emergency (missed pill)
7. If you miss taking one pill: take it as soon as you remember plus the one for that day at the regular time.

Two pills: take the two pills as soon as you remember and two pills the next day. Then one pill a day as scheduled.

three or more: you may become pregnant. Throw away the half used pack of pills and start a new pack on the first Sunday after you missed the pill, even if you are bleeding.

Use the second method while you are off pills and also for the first two weeks while you are on the new pack.

8. If you miss your period

If you miss one or more pills and skip a period, consult your doctor for a pregnancy test.

9. If you do not miss a pill and skip a period: although you are not likely to be pregnant consult your doctor. Start the new pack only after ruling out pregnancy and use the back up method until then.

10. Consult your doctor if there is vaginal spotting or irregular bleeding.

11. You require a complete physical examination every six months while you are on the pill.

12. If you see any doctor for any problem mention that you are on the contraceptive pill.

Brand/Cost

LOW DOSE PILL	OVRAL-L x 21 (Wyeth)	: Ethinyloestradiol 0.3mg Norgestral 0.3mg Tab: Rs. 5.00 for 21
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TRIPHASIC PILL

TRIQUILAR x 21 (Schering)	: Ethinyloestradiol Levonorgestrel 6 brown, 5 white and 10 ochre tabs: Rs. 7.50 for 21 (one course).
------------------------------	--

HIGH DOSE PILL	MINOVLAR ED x 28 :	ethinyloestradiol	0.5mg
	(Schering)	Norethisterone acetate	1.0mg
	OVRAL x 21 :	Ethinyloestradiol	0.5mg
	(Wyeth)	Norgestral	0.3mg
	Tab: Rs. 5.00 for 21		

NATIONAL TUBERCULOSIS CONTROL PROGRAMME

GOVERNMENT OF INDIA

Long term:

1. Regimen TH : Thioacetazone (T): 150mg
INH (H): 300mg
taken orally at a time after meal daily for 12-18 months
2. Regimen SH (TW) : Streptomycin (S): 0.75g IM
INH (H) : 600-700mg orally
Twice a week (3 & 4 days interval)
for one year (104 doses)
Pyridoxine: 10mg biweekly to prevent neuritis.
3. Regimen EH : Ethambutol (E): 800mg for patients weighing less than 50kg and 1200mg for those with weight more than 50kg. INH (H): 300mg orally, daily after meals for 12-18 months.
4. Biphasic regimen : Initial intensive phase (3 drugs)

Streptomycin:	0.75g IM
Thioacetazone:	150mg oral
INH:	300mg oral

or

Streptomycin:	0.75g IM
Ethambutol:	800/1200mg oral
INH:	300mg oral

daily for 2 months

Followed by (2 drugs)

Thioacetazone: 150mg
INH: 300mg oral

or

Ethambutol: 800/1200mg
INH: 300mg oral

daily for 10–16 months

Note:

1. The biphasic regimen is preferred
2. Doses stated are for adults
3. Optimum period of treatment is 18 months (minimum: 12 months)

Short courses:

1. Policy A: 2 S₂ H₂ R₂ Z₂ / 4 H₂ R₂

Intensive phase (4 drugs)

Streptomycin: 0.75g IM
INH: 600mg oral
Rifampicin: 600mg oral
Pyrazinamide: 2g oral

Twice a week for 8 weeks

Followed by (2 drugs)

INH: 600mg
Rifampicin: 600mg

Orally, twice a week after meal for 4 months.
Total period 6 months

When streptomycin is not tolerated, Ethambutol 1.6g twice a week can be substituted.

Initial phase: (4 drugs)

Ethambutol: 1g

INH: 300mg

Rifampicin: 450mg

Pyrazinamide: 1.5g

Daily after meal for 2 months

Followed by (2 drugs)

Thioacetazone: 150mg

INH: 300mg

Daily after meal for 6
months.

Total period 8 months

- Note: 1. Where Thioacetazone is not tolerated, Ethambutol can be substituted (Dose: 15–25mg/kg body weight).
2. Doses stated are for adults
3. Ethambutol is not recommended for children below 12 years of age.

..... **HOSPITAL,**

.....

ADVERSE DRUG REACTION

H. No. Date:

Name of Patient Ward

Age Sex Religion

Drugs Used: Generic Name:

Brand Name Firm

Route Dose Date given

Reaction
(Describe)

.....
.....

Doctor's Name	Designation
Department/Unit	

Signature (in full)	Signature of Senior Doctor
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ERRATA

PAGE NO. 5:

Read "Mr. Alan Craner, Mysore"
as **Mr. Alan Cranmer, Mysore.**

PAGE NO. 6: 6th point:

Read "c. Hospital registrat mber"
as **Hospital Registration Number.**

PAGE NO. 21: 15th point:

Read "Fixed dose combinations of steroids for internal use except combination of chloramphenicol and streptomycin."
as **Fixed dose combinations of steroids for internal use except combination of steroids with other drugs for the treatment of asthma.**

PAGE No. 250:

Read "21.1.1 ORS: See"
as **21.1.1 ORS: See page 64.**

